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ABSTRACT

The intent of this publication is to support schools as they connect the vision they have for technology and student learning with the tasks they need to accomplish in order to achieve their vision. Chapter 1 provides an understanding of the origins of "Planning into Practice" and lays the groundwork for how to use the materials. Chapter 2 focuses on technology planning and the processes involved in creating a strategic technology plan. Chapter 3 provides strategies and tools for integrating technology into the curriculum. Chapter 4 is an overall orientation to professional development as a process of design, and it also addresses technology competencies for teachers and presents ideas for professional development. Chapter 5 features community engagement. Chapter 6 focuses on managing hardware and software and discusses various computer configurations for educators, how to make the most of a few computers, methods for evaluating software, and software resources. Chapter 7 presents a model and instruments for evaluating a technology program. Chapter 8 provides resources and recommendations for funding technology initiatives. Throughout the text, URLs are included to online resources and other materials. The Appendix includes blank forms used in the text that may be reproduced. Also included are a few additional resources and printouts of Microsoft PowerPoint Presentations that present the key points in each chapter; these are also available online at the SEIR-TEC web site at http://www.seirtec.org. Early in each chapter the tools provided in that

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chapter are listed. At the end of each chapter, a "Putting It All Together" section is provided. (AEF)

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Planning into Practice

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Planning into Practice

Resources for planning, implementing, and integrating instructional technology

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with

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The document was developed and published by SEIR•TEC partners
Learning Innovations at WestEd, Southwest Educational Development Laboratory (SEDL), and SERVE

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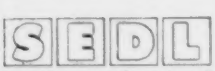

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The SouthEast and Islands Regional Technology in Education Consortium (SEIR•TEC) is funded by the U.S. Department of Education to support the use of technology for teaching and learning. As part of our program, we have been working with a group of schools across the region for several years, providing substantial levels of professional development and technical assistance. We refer to these schools as intensive sites. Over the course of the project, we have developed effective strategies, tools, instruments, and other resources aimed at helping the intensive sites build their technology programs. In the process, we have learned much from the teachers and administrators at those schools about what it takes to integrate technology into teaching and learning, and especially about the great challenges posed in resource-poor schools and districts.

In the belief that other schools across the nation might find these strategies and tools useful, we have created *Planning into Practice: Resources for Planning, Implementing, and Integrating Instructional Technology*. The book is designed for teachers, administrators, and all those interested in strategic educational technology planning and the implementation of those plans.

Jeff Sun, director of Sun Associates and partner consultant to SEIR•TEC, is the primary author of *Planning into Practice*. Jeff has worked with SEIR•TEC's intensive sites and hundreds of other schools and teachers at all levels of expertise across the nation. He has contributed thoughtful effort to capture tools, devices, and checklists that could help schools move ahead in their efforts to integrate technology. Contributors Vicki Dimock and Marilyn Heath from the Southwest Educational Development Laboratory (SEDL) and Jan Phlegar from Learning Innovations at WestEd, draw upon extensive personal and organizational experience working with new technology innovations and helping teachers integrate technology into their curriculum. And, as the project director, I felt compelled to add my two cents' worth.

We want to thank the teachers and administrators at SEIR•TEC's intensive sites, especially all the teachers with whom Jeff Sun and the other SEIR•TEC staff have worked, for sharing their skills, concerns, and frustrations related to the use of instructional technology. In turn, we would like to thank the SEIR•TEC staff for sharing their ideas, strategies, and materials and for providing valuable suggestions on how *Planning into Practice* might be improved.

Thanks also go to Sun Associates staff members Jeanne Clark and Gail Doherty, who developed and field-tested early drafts of some materials; Margaret Bingham and members of the SEIR•TEC staff, who returned thoughtful comments on drafts; and especially Beth Thrift and Beth Hartness, research assistants for SERVE, who coordinated the development process.

All of us on the SEIR•TEC staff hope you find *Planning into Practice* useful and that you learn as much from using it as we did in developing it. Please check our web site from time to time for updates of the materials at http://www.seirtec.org.

Elizabeth Byrom, Ed.D.
Director, SEIR•TEC

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Chapter

1

Introduction

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Chapter 1

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Purposes of Planning into Practice

A vision without a task is only a dream.
A task without a vision is mere drudgery.
A vision with a task can change the world.
Attributed to Black Elk

As in any other profession, schoolteachers, principals, and administrators need a vision to help them toward their goals. This is the context and underlying principle of *Planning into Practice: Resources for Planning, Implementing, and Integrating Instructional Technology*. The intent of this book is to support schools as they move along a continuum that connects the vision they have for technology and student learning with the tasks they need to accomplish in order to achieve their vision, in a way that makes a difference.

Technology is a tool that can promote greater learning, but only if its use is planned and carried out with that goal in mind. Success of technology implementation depends not only on how well technical components are planned but, more importantly, on how well the school community goes beyond technical requirements. The whole endeavor of teaching must be supported and carried through in a way that demonstrates the benefits of teaching and learning with technology, addresses an individual's fears as well as hopes, and helps all involved learn how and when these tools might best be used.

If implementing strategies for using technology to improve student learning is the overarching goal, educators need the how to's of creating effective technology plans, and steps for implementing them. The questions are many: How do we begin? We've had equipment for years, but how can we use it more efficiently and effectively? What do we do about the resources we'll need? What equipment do we *really* need? What can I do to integrate technology to enhance learning in social studies (or science, or art, or . . .) and how do I manage that specific task?

Some communities may have a wealth of assistance in initializing their technology programs. Other communities may have the benefit of a visionary leader who supports the changes necessary for successful technology integration. Still others may only be in the initial stages of planning, or they may not have strategically examined where they want to go in a way that builds a large school community movement. Wherever a school or district is now, there is progress to be made in using technology to promote greater student learning and in understanding more about how to go about achieving this goal.

This guidebook is for use by all the teachers, administrators, and policymakers who work to integrate and implement instructional technology. While we hope it may serve as a guide to technology planning and provide a useful set of

processes for implementing the plan, it is not a compendium of all you need to know about instructional technology. Rather, it should be considered more as a set of tools and information to help with the tasks that can lead to something greater—improving teaching and learning for *all* students.

How this Publication Came About

It's one thing to have a technology plan, and another to have a truly effective *strategic* plan that has been developed with the big picture of educational improvement in mind. Furthermore, even the best plan needs to be supported by an assortment of individual strategies, actions, and (dare we say?) tricks, to make it come together and work for students.

Having said that, we have two purposes for creating this publication. First, we want to assist readers—be they teachers, administrators, or community members—in making their district or school technology plan a *strategic* educational plan. Second, we want to offer a variety of actions that can be taken to begin to implement the goals and objectives of the technology plan. For practical use, we have included checklists, tip sheets, and worksheets that you can adapt for your own needs.

About SEIR•TEC

Before we go further, we'd like the reader to know more about the context in which this book evolved. SEIR•TEC is one of six regional technology in education consortia (R•TEC) funded by the U.S. Department of Education's Office of Educational Research and Improvement. SEIR•TEC is composed of educational organizations committed to providing information, professional development, and technical assistance for educators in the southeastern states, Puerto Rico and the US Virgin Islands, in order to support and promote improvement in teaching and learning. Seven organizations make up SEIR•TEC: SERVE (lead agency); AEL, Inc.; the Instructional Technology Resource Center at the University of Central Florida; Learning Innovations at WestEd; the National Center on Adult Literacy; Southwest Educational Development Laboratory; and the Southern Regional Education Board. The following mission statement guides the work of the consortium:

> **SEIR•TEC promotes the use of technology to improve teaching and learning by providing leadership through technical assistance and professional development in the areas of curriculum and instruction, policy, planning, and evaluation, with emphasis on benefiting traditionally underserved populations, such as low-income, urban, rural, and racial- and language-minority populations.**

The authors of this publication are affiliated with the SEIR•TEC organizations and have had extensive firsthand experience helping schools with their technology planning and integration efforts. Our work is grounded in research, effective practices, and an understanding of the factors and processes that promote and support systemic change, as well as our collective wisdom and experience. We make available a program of consortium services to a variety of audiences and service providers in order to address our mission of improving teaching and learning through the use of technology. While our direct services are to our region, we also work with the other R•TECs to create a national system of support. For more information, please consult the R•TEC web page at http://www.rtec.org/.

The SEIR•TEC Intensive Site Initiative

One of SEIR•TEC's flagship initiatives is our work in partnership with *intensive sites*. These are schools and districts that have the goal of incorporating technology in ways that promote better teaching and learning for their students. Most of these sites are economically disadvantaged schools and districts with high numbers of traditionally underserved populations, each of which is struggling to achieve technology integration and use in the face of many obstacles. Each has its own unique student population, teacher corps, and learning environment.

For each intensive site, SEIR•TEC has provided on-site technical assistance, resources, and professional development. Typically, that means each school is assigned a staff member who meets with teachers at regular intervals. Sometimes, it means bringing in someone with special expertise, such as web site design, program budgeting, or program evaluation. Intensive sites may also participate in SEIR•TEC Academies and other professional development opportunities. Our partnership with the intensive sites as they attempt to move through the stages of planning into practice has allowed us to understand more fully the many factors that affect their success.

As we began providing the technical assistance and capacity-building that these schools could not otherwise obtain, we also began documenting the process of technology adoption and the factors that affect success. There is a solid body of research on the factors that affect the use of technology, such as those supported by the technology-rich Apple Classrooms of Tomorrow studies.[1] However, there is a dearth of information about effective strategies for technology adoption and integration in technology-poor environments, such as the majority of the SEIR•TEC intensive sites.

So, part of the evolving design of the intensive site initiative, and what puts it in the category of high-impact technical assistance, is that we are learning lessons through this partnership that can inform practices to support technology adoption and integration in similar schools and districts. While the tools and

[1]David C. Dwyer, Changes in Teachers' Beliefs and Practices in Technology-Rich Classrooms, *Educational Leadership*, vol. 48, no. 5 (1991), pp. 45–52.

advice contained in this guide can be equally useful in resource-rich and resource-poor environments, it is clear that the barriers faced in the more disadvantaged sites cannot be overcome by providing a set of materials, tools, guidelines, or even money—alone! Continuing to deepen our understanding of the issues is essential if we are to help the schools succeed.

After three years of working in the intensive site schools and districts, we documented observations about how technology may be successfully integrated into teaching and learning. We offer these learnings here; the booklet can also be downloaded from our web site at http://www.seirtec.org. As *Planning into Practice* goes to press, we are updating the lessons learned, which will also be available on our web site.

Factors Influencing the Effective Use of Technology for Teaching and Learning: Lessons Learned from the SEIR•TEC Intensive Site Schools

Over the past three years, SEIR•TEC has been providing substantial levels of technical assistance and professional development to fourteen resource-poor schools across the Southeast and Islands. Typically, the on-site work entails a member of the SEIR•TEC staff spending three or four days per month in a school, working on various aspects of technology integration. The nature and extent of the staff development and technical assistance are determined in large measure by local teachers' and administrators' needs and exigencies, such as technology planning, teaching with technology, and program evaluation.

Our work in the intensive site schools has served as a rich opportunity to study the way technology is, or is not, successfully integrated into teaching and learning. The following narrative represents some of our observations and lessons learned thus far.

1. Leadership is the key ingredient.

Our experiences in working with the intensive sites confirm what the research literature says, that leadership is the single most important factor affecting the successful integration of technology. This is true at all levels—state, district, and school. For example, the states with the most successful technology programs are those that have had visionary governors, legislators, and department of education staff who are committed to the use of technology as a tool for teaching and learning. Similarly, the schools who have made the most progress, including our intensive sites, are those with energetic and committed leaders. Here are some more specifics.

The Vision Thing

It is especially important at the school level for the principal to have a vision of what is possible through the use of technology and be able to work with others to achieve the vision. Without this vision, and the translation of the vision into action, lasting school improvement is almost impossible. We notice time and time again that the schools in which we have had the greatest impact are the ones

with the strongest leaders—leaders who are committed to helping their teachers and students use technology effectively.

Leading by Example

Effective principals lead by example. They have a clear idea about how technology can support best practices in instruction and assessment, they use technology fluently, and they participate actively in professional development opportunities. The leader who expects to see technology used in the classroom but does not know how to use e-mail sends, at best, a mixed message.

Leadership + That First Success = Vision Accomplished (from Booneville, Mississippi)

"One of the most important lessons by far is the fact that it takes supportive leadership to ensure an intensive site is successful. Supportive leadership can be in the form of allowing teachers to have substitutes while they attend a workshop, encouraging teachers to work in teams or participating in training sessions themselves. These [leadership] attributes provide a positive, workable environment for the teachers. . ." according to Jeanne Clarke, SEIR•TEC Intensive Site Coordinator for Booneville Middle School. Who was this leader? The school principal, Linda Clifton. Ms. Clifton had such a strong vision of how technology could benefit the students of Booneville Middle School that she began to seek help from many different sources. With her first grant proposal funded and with ongoing training and technical assistance from SEIR•TEC, she leveraged this initial support to obtain additional resources. All the while, she urged, supported, and energized the teachers to incorporate technology into the classroom activities. From a couple of Apple IIe computers to a fully networked school and a new, technology-rich science wing, Ms. Clifton led the Booneville Middle School staff to use technology to benefit student learning. In 1998, the school was one of 50 schools from across the nation to be recognized at the SchoolTech Expo Showcase of Model Schools, a program to honor schools who have used up-to-date technology to dramatically improve classroom learning.

Supporting the Faculty

In addition to modeling the use of technology, supportive school principals highlight the efforts of teachers who attempt to use technology to improve teaching and learning. Effective leaders also attend professional development sessions with their teaching staff.

No Reform-of-the-Month Clubs

Real reform takes a lot of time and energy. Faculty who are bombarded with a constant stream of new initiatives to be implemented quickly become overwhelmed and resentful. Effective school leaders focus on reform initiatives that offer the most promise for improving teaching and learning, and they ensure that faculty have the resources, skills, and time necessary for turning the promise into reality.

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Shared Leadership

School technology committees can serve an important role in making decisions that reflect the needs of a total school community. School leaders help this happen by showing both interest and trust in decisions that the group makes. Committee members should be those who are representative of the total faculty and staff and selected by a method other than principal-appointed. Committee meetings should not begin with the principal or technology coordinator announcing his or her software decision and who will get the new computers that just arrived. Shared input and decisions are critical for committee members to feel that they serve a real role and to reduce the chances that decisions will be sabotaged.

2. If you don't know where you're going, you'll end up someplace else.

Each organization, whether it be a district or an individual school, needs to spend time developing and updating a comprehensive plan—starting with its vision, mission, and goals. Every decision made should be one that supports the organization's vision. The degree of success that a school has in implementing technology will depend, in part, on the quality and maturity of its technology plan. A technology plan that reads like a shopping list cannot guide a school in making its hardest decisions. A useful plan reflects the ideas of an entire school community and is connected to overall school goals. It focuses on the use of technology to support teaching and learning. When we first began working with the intensive site schools, many needed assistance not only in writing a plan, but also in creating a process for developing, implementing, and updating the plan. After all, there's not much point in spending time and energy on a plan that's going to sit on a shelf and not be used.

We have noticed that the plans and processes created at some of the intensive site schools share some of the same problems as school technology plans everywhere. The first is a tendency for one individual or a few people to write the plan, a practice that flies in the face of the notion of stakeholder buy-in and community involvement. A second is that many plans lack a detailed component or plan for professional development that covers the broad range of skills teachers and administrators need. The third common problem is that most plans lack a component for evaluating the success and effectiveness of the program. The omission of components usually stems not from a lack of interest but perhaps from a lack of expertise in how to set up an effective professional development program in technology or how to conduct an evaluation that will yield meaningful and useful results.

Implementing the plans also requires working together in groups, devising new patterns for staffing, and many other organizational changes that are brought on by the use of technology. However, many plans never go beyond the early stages of implementation, because no one is assigned responsibility for the implementation activities. Someone must be in charge for technology plans to be implemented.

3. Technology integration is a *s-l-o-w* process.

Truly integrating technology into teaching and learning is a slow, time-consuming process that requires substantial levels of support and encouragement for educators. The Apple Classroom of Tomorrow studies (Dwyer et al., 1991) of what happens in technology-rich environments have shown that teachers go through predictable stages in their use of technology and that this process takes from three to five years. We have found that in technology-poor schools, the process takes even longer. In our intensive sites, we have also started to notice that there seems to be a correlation between the amount and level of technical assistance we provide and movement along the continuum of technology integration, i.e., the schools that receive the most attention are making the most progress.

Unfortunately, in most of the resource-poor schools in our region, teachers have only had access to the basic types of training in which they learned to use a single application. Follow-up and support are the exception rather than the rule.

4. No matter how many computers are available or how much training teachers have had, there are still substantial numbers who are "talking the talk" but not "walking the walk."

When you consider the fact that microcomputers have been in schools for almost twenty years, and considering that most teachers have participated in some type of professional development, it is still surprising to see how many teachers there are who do not use technology at all. We know and appreciate that there are a variety of reasons, some of which we cannot do anything about and others that we can do something about. For example, there are a few research studies that indicate that some teachers have a natural proclivity toward using technologies in general and computers in particular, while others do not. And, like the general population, there are some teachers who embrace change, while others resist it. On the other hand, there are some research-based practices and common-sense strategies we can implement that enhance the likelihood that teachers will begin using technology.

a. Begin with teaching and learning, not with hardware and software. As technology-oriented professionals, we have a tendency to frame professional development and echnical assistance around technology tools, such as word processing and databases. We tell teachers, "Now what you need to do is integrate word processing into your lesson plans," which can work with motivated teachers, but not those who need a lot of support (or a gentle shove). In short, teachers have a difficult time applying technology skills in the classroom unless there is a direct linkage with the curriculum, teaching strategies, or improvements in achievement. Professional development tends to have a stronger impact when we frame it like this: "Let's look at what students are learning this year and then see how technology can make it more effective."

b. The training-of-trainers model means more than providing a workshop to a few people, and professional development might just be the most misunderstood or misrepresented model in education. Quite often it is

interpreted as one or two people delivering a workshop in which the participants are supposed to acquire the content knowledge and training skills needed for conducting turnaround training. Unfortunately, this seldom works because (a) the content is too complex to be mastered in a one-shot workshop, and there is no follow-up accommodation for the would-be trainers to become proficient; (b) there is no support for turnaround training; or (c) the would-be trainers are inexperienced trainers. For the model to work, all three barriers must be overcome.

c. It's a waste of time and energy to provide technology training when teachers don't have the resources, opportunity, and support needed to apply their new knowledge and skills. It should go without saying that it makes absolutely no sense to provide training on technology applications when teachers don't have access to appropriate hardware and software. Unfortunately, however, some school leaders continue to follow the tradition of sending teachers to workshops when it's convenient rather than when it's logical. All too many districts hold training during the summer even though teachers won't have the technology or support materials until January. On the other hand, districts with effective programs tend to use more thoughtful approaches, such as one in Georgia that gives their teachers software two weeks before training events, so they will have time to get a sense of what it will do and how it works.

5. Effective use of technology requires changes in teaching; in turn, the adoption of a new teaching strategy can be a catalyst for technology integration.

While legislators often expect to see a direct correlation between the amount of money spent on computers and improvement in students' scores on standardized achievement tests, we have observed that there are several intervening variables, such as the amount and quality of technology use by the teacher and the student. Effective use of technology often requires changes in the way teachers teach. In many cases, this means that teachers embrace strategies for

Technology: A Partner in Creating Success (from Pocahontas, Arkansas)

Arkansas media specialist Lin Hatch has seen the positive effects of using technology to tailor instruction to students' needs. One particular young student at Pocahontas High School was a very low achiever, in spite of his efforts. His home life was even more distressing after the death of the one parent with whom he lived. Lin, however, witnessed a difference, as this young boy began to use the Accelerated Reader program and its computer assessment tool, *STAR*. The program analyzes a student's reading level and suggests appropriate, high-interest materials. As his reading improved, so too did his motivation and self-esteem.

student-focused learning, such as tailoring instruction to meet individual students' learning needs, helping students develop problem solving and critical-thinking skills, and providing opportunities for project-based learning. It's the combined effect of effective teaching and pedagogically sound technologies that lead to improvements in learning.

We have found that when professional development and technical assistance start with a particular teaching or learning strategy that the teachers believe will benefit their students, such as cross-curricular thematic units, and then help teachers discover ways technology is a tool that supports the strategy, teachers are usually eager to try both the new instructional strategy and the technology.

Training in a Void
(from Whiteville, North Carolina)

The days at Central Middle School are busy ones, as teachers and students strive to increase student achievement. Technology resources are available and, in the past few years, have continued to increase in quantity and type. Yet, a major difference in the use of technology for teaching and for student projects is just now beginning to occur. Students are developing multimedia reports and searching the Internet; teachers are teaching with computer teaching stations and incorporating web sites in their lesson plans.

What has made the difference? A combination of curriculum-focused training by SEIR•TEC Intensive Site Coordinator Donna Ashmus and the availability of an instructional technology coordinator funded by a TLCF grant. The combined efforts, under the direction of the district technology director, Patricia Medlin, have provided technology training when teachers have the resources, opportunity, and support needed to apply their new knowledge and skills.

6. Each school needs easy access to professionals with expertise in technology and pedagogy.

Our experiences in the field confirm the notion that teachers need on-site and on-demand technical assistance with both the technology and the integration of technology into teaching and learning. Finding professionals who have expertise in both areas is difficult, and few schools have professionals with both. Many districts hire curriculum specialists and technology specialists and hope they work together. Sometimes they do; sometimes they don't. Resource-poor schools might have a curriculum specialist, but they seldom have access to anyone, in-house or out, with the skills to assess their hardware requirements or troubleshoot problems as they start using new hardware and software.

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A Place to Call Home
(from Brownsville, Tennessee)

Three years ago the view from the hallway of East Side Elementary School was quite different: Piles of books, old TVs on carts, broken sofas and chairs, empty boxes. Now, a glance inside is enough to cause a double take! There are two computer stations—soon to be three—with printers and Internet connections, neatly organized shelves of software and teacher materials, a rack of technology magazines, and a center work/meeting table.

Yet, it is not the "stuff" in the staff technology room that causes the double take, but the people engaged in conversation at the table, the users at the computer stations, and the staff member breezing through to pick up a piece of software. The room is being used. Members of the school staff are comfortable using the room and its contents, because this is where part of their training occurs. This is where the school tech team meets to explore and learn new software programs to later teach others, as well as where the vice-principal, Rhonda Thompson, and the tech team discuss next steps to connecting every classroom to the Internet.

What brought about this change? Donna Ashmus, SEIR•TEC Intensive Site Coordinator, remembers meeting with the school staff to outline technology initiatives necessary for teaching and learning to benefit from technology. One need was a place for staff to learn about and work with technology on an ongoing basis. A workshop or two was not enough, and training without resources and support was a waste of time. The staff technology room was born: a comfortable, user-friendly, ongoing place for just-in-time learning. Teacher-to-teacher training, resources, opportunity, and support must all exist for technology training to bring about change.

7. While many of the barriers to using technology to support learning are the same for all poor communities, some populations have some additional issues.

The SEIR•TEC consortium tries to address the needs of four constituent groups concerned with the effective use of technology in support of teaching and learning: K–12 educators, adult literacy programs and communities, state departments of education, and college teacher-education programs. As we strive to make resources available to the widest number and variety of programs, we try to enable constituent groups to build on each other's work rather than continuously reinventing the wheel. In particular, adult educators benefit from opportunities to work with and/or learn from experienced, thoughtful K–12 educators. However, the adult literacy learners and settings are different enough from K–12 that the adult educators find that they also need to take these learnings and resources and then rethink and repurpose them to create methods and materials that can be effective in their own instructional settings.

Another group that merits special consideration are the thousands of Spanish-speaking educators and students in Puerto Rico. Throughout much of

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the Spanish-speaking world, educational software in that language is relatively abundant. In Puerto Rico, however, it is just beginning to appear. Until recently, technology appeared for many teachers to be destined for the English teachers only, and not for teachers of other subject matter, which is all taught in Spanish.

8. In some schools, infrastructure remains a serious barrier to technology adoption.

It is very difficult to focus on integrating technology to support learning if you cannot overcome basic technological equipment and facilities issues. Schools that serve students in economically disadvantaged areas typically have greater barriers than schools in affluent communities in getting the basics in place. Many of the schools in our region are cases in point. In some instances, the buildings are so old that establishing an infrastructure is very difficult. For example, there are no T1 lines to the Virgin Islands, and some schools do not have access to telephone lines. In other places, the lack of security is a problem. Some of our schools cannot put computers in classrooms unless the windows are secured, which usually means installation of iron bars. And, living in the Southeast, we are occasionally reminded of the impact that the weather has on schools, such as hurricanes that wipe out microwave communication towers or destroy entire school facilities.

Many schools also have access issues, in part because basic electricity is not sufficient; the electrical infrastructure of many schools is unable to handle the additional load required by computer networks. In Puerto Rico, for example, there is a long list of schools that need major upgrades, which require major infrastructure investments.

9. Educators can benefit from tools that help them gauge the progress of technology integration over time.

One of our most recent observations originated not with the intensive sites, but with some technical assistance SEIR•TEC staff provided to the North Carolina Department of Public Instruction (NCDPI). The Department had asked for help in developing a way of collecting comparable evaluation data from 44 diverse Technology Literacy Challenge Fund (TLCF) grants. Working with DPI staff, we developed an instrument that has been adopted across the state as well as in other states. We have observed that the instrument not only serves its original purpose but also provides a non-threatening framework for gauging a school's or district's progress toward technology implementation. Administrators report that it is a tool that helps educators reflect on where they are and where they need to go with their technology initiatives.

In the belief that helping educators reflect on their progress could potentially accelerate the rate of progress, we adapted the original instrument for use in the intensive sites. Basically, the adaptation involved the identification of five domains of technology integration, principles of good practice for each domain, and indicators of progress for each principle. Staff also compared the domains

and principles with other instruments such as the CEO Forum's STaR Chart and the Milken Exchange's Frameworks for Technology Integration to ensure that ours covered all the bases. We just completed the first round of implementing the instrument in most intensive sites, and so far, the teachers and administrators have reported that in addition to being a useful gauge for progress in general, the instrument is a good basis for discussing specific technology initiatives across the district. It also helps them see the bigger picture of technology integration by showing principles of practice that they have not yet addressed. We will monitor the use of the instrument over the next several months and see whether it does indeed make a difference in program planning and implementation. For more information about the instruments, go to http://www.seirtec.org.

Nine Lessons Learned:

1. Leadership is the key ingredient.
2. If you don't know where you're going, you'll end up someplace else.
3. Technology integration is a *s-l-o-w* process.
4. No matter how many computers are available or how much training teachers have had, there are still substantial numbers who are "talking the talk," but not "walking the walk."
5. Effective use of technology requires changes in teaching; in turn, the adoption of a new teaching strategy can be a catalyst for technology integration.
6. Each school needs easy access to professionals with expertise in technology and pedagogy.
7. While many of the barriers to using technology to support learning are the same for all poor communities, some populations have some additional issues.
8. In some schools, infrastructure remains a serious barrier to technology adoption.
9. Educators can benefit from tools that help them gauge the progress of technology integration over time.

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This Guidebook and SEIR•TEC's Intensive Site Work

Some of the templates and tools included here have been used with the intensive sites as they engaged in various phases of making their technology plans more comprehensive, inclusive, and strategic. But, like most complex systems, schools do not have just one thing happening at a time. In fact, moving something forward in a school is always a difficult task, even in the best of situations when everyone wants to see progress. It is important to realize that many different things are happening at each site, with different people at different times; so, although this guide may appear to be laid out in a logical and linear manner, keep in mind things seldom happen that neatly!

Organization of this Guidebook

Planning into Practice is organized so that it can be used in a variety of ways. Some readers may choose to start at the front and work their way through the book. Others will find that it is possible to skip around, using the resources as they need them. Throughout the text, we included many URLs to online resources and other materials we believe the reader will find useful. Also, since much of this material originated in workshops and other staff development sessions, we have included a set of Microsoft PowerPoint Presentations that summarize and present the key points in each chapter. These are also available online at the SEIR•TEC web site at http://www.seirtec.org.

The chapters of this book are organized as follows:

- **Chapter 1** provides an understanding of the origins of *Planning into Practice* and lays the groundwork for how to use the materials.
- **Chapter 2** focuses on *Technology Planning* and the processes involved in creating a strategic technology plan. This chapter is also useful for those involved in revising an existing technology plan.
- **Chapter 3** provides strategies and tools for *Integrating Technology into the Curriculum*.
- **Chapter 4** is an overall orientation to *Professional Development* as a process of design, not just a series of workshops. It also addresses technology competencies for teachers and presents ideas for professional development that will help educators acquire those competencies and reach their larger goals.
- **Chapter 5** features *Community Engagement*, one of the key ingredients to a successful school community approach to technology use as a tool to promote learning.
- **Chapter 6** is on *Managing Hardware and Software*. We provide a discussion on various computer configurations for educators, how to make the most of a few computers, methods for evaluating software, and a list of software resources.

- **Chapter 7** presents a model and instruments for evaluating your technology program.
- **Chapter 8** provides resources and recommendations for funding technology initiatives.
- The **Appendix** includes a series of blank forms used in the text that you may reproduce for your own use. We have also included a few additional resources and printouts of the PowerPoint overview presentations that are available online at the SEIR•TEC web site.
- Early in each chapter, we list the tools provided in that chapter. Readers may find it useful to refer back to these sections to locate a particular resource that they can use in their own environment. In addition, at the end of each chapter we provide a **Putting It All Together** section, which is a dialogue between the editors of *Planning into Practice* and the primary author, Jeff Sun. Jeff offers advice and ideas for troubleshooting in these exchanges. For more advice directly from Jeff and to find additional tools and resources, you can visit his web site at http://www.sun-associates.com.

Chapter

2

Technology Planning

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Technology Planning

Why Plan?

As we meet with teachers and administrators across the country and in our service area, it becomes very clear that while most educators understand that they need a plan, it is the rare district that appreciates the necessity of a *strategic* plan. A strategic plan contains a vision for technology's place in the classroom and is accompanied by a series of goals and objectives, an action plan, and a timeline. Within this strategic framework, there are broad outlines and details for all of the steps involved in technology implementation—the building of the infrastructure (hardware and software), adoption of student and teacher technology competencies, professional development strategies, purchasing, funding, scheduling, support, and evaluation. The value of a strategic plan is that it creates the big picture and also provides the framework for the myriad individual strategies and actions that must take place to bring everything together successfully.

While planning is a key to successful technology implementation and integration, planning for technology is not an end in itself. It is a process that strategically moves from vision to reality—**from planning into practice.**

With multiple technology funding opportunities available from state departments of education, the federal government, and many private sources, school districts are usually required to submit their technology plans in order to access the funds. Even if a school or school district doesn't search out external funding for its technology program, having a well-designed technology plan is quickly becoming an integral part of comprehensive educational planning. It is not surprising that funders have established such a requirement or that districts require a plan for technology integration. However, we often wonder whether the words in these plans connect with teachers and students and result in generating strategies with a positive impact on teaching and learning.

With this in mind, we have two goals to accomplish in this publication. First, we want to assist readers in making their district or school technology plan a *strategic* educational plan. Second, we want to describe the variety of actions that teachers and others involved in the process can take to implement the goals and objectives of the plan.

Desired Outcomes

In addition to the aforementioned motivators for planning, making things turn out right is also a powerful motivator. But what do we mean by "right"? Our experience indicates that "right" is the desired outcome for an individual, group, or institution. Following are some desired outcomes that planners strive to achieve:

- Technology is an integral part of a comprehensive plan for improving student learning.
- Teachers are sufficiently comfortable with learning and using technology tools, and they use these tools as a natural and welcome extension of their teaching.
- Teachers use technology fluidly and almost transparently to accomplish curriculum goals.
- Technology is well-supported both in terms of fiscal resources (money allocated to buy materials and equipment) and human resources (people allocated to support users and equipment).
- The school community is confident that funds (and other resources) they allocate for technology are responsibly used to the maximum benefit of students.
- Parents and others in the school community are satisfied that students are learning information-age skills but do not believe that technology is the focus of instruction.
- The school community is confident that a path has been set which accounts for constantly changing technology as well as student needs.

The Planning Process

You may have previous experience in project planning and implementation that you can use for technology planning. Your experience might come from planning and carrying out educational programs, sports events, family vacations, parties, art exhibits, and so on. Maybe you have even built a house or boat! While the scale of the project and the results of those activities might have been different, the processes for accomplishing them are basically the same as those applied to technology planning.

For comparison, let's use the analogy of building a new house and compare it to the technology-planning process. While you may not have had either of these experiences, just imagine along with us. Keep in mind that these are not necessarily sequential steps, and they may occur in any order. Furthermore, while carrying out the process you may find that some of these components need to be reviewed when new information emerges and takes on new importance. The chart on page 22 shows an example of such steps.

Just like building a house, technology planning and integration are both complex processes that require time and take place *over time*. This point is often lost on technology planners who would like to believe that they can simply write a plan and then implement it quickly and easily. You cannot build a house without taking the time to plan and taking the time to build properly. It doesn't just happen as you go along! Furthermore, in the same way that building a house

requires more than just a lot of materials, technology planning is not simply about hardware, software, cables, and connections. It's also about managing people and resources for accomplishing what you have set out to do.

In essence, there are two key points of technology planning—time and strategic action:

- **Time.** Describing what you want to accomplish in your technology plan is not enough. You must also indicate when you need to perform specific tasks. In short, a strategic plan is about taking certain actions according to a time schedule to accomplish or achieve your ultimate vision of technology's place in your teaching and learning environment.
- **Strategic Action.** In practice, strategic planning is a series of linked and interwoven action steps. These actions include planning to plan, gathering information, identifying resources, managing resources, providing professional development, purchasing materials, writing curriculum, and evaluating progress, as well as many others. All of these actions are designed to achieve particular goals, and each goal is designed to support the overall *vision* of the plan. In general, you need to plan with your results in mind.

	A New House	Technology Planning
Guiding Structure	• Be aware of deed restrictions in the area where you want to build your house.	• Be cognizant of state and district guidelines.
Stakeholders	• Identify all those who will be living or staying in your house.	• Identify all those who will be using your technology (students, teachers, parents, businesses, community).
Preparation	• Plan to plan. • Gather information: look at other houses and house plans. • Consult with a builder or architect. • Research the features you want to include in your house. • Draw upon your own experiences. • Talk to others who have built a house. • Identify resources available and how much they will cost.	• Plan to plan. • Start to accumulate information on the pieces of the plan. • Solicit the help of outside experts. • Research the ways that technology enhances teaching and learning. • Draw upon your own experiences. • Consult with others who have experience with technology integration. • Visit other schools and school districts. • Identify resources and how much they will cost.
Time	• Start with the end in mind and work backwards. If that is not practical, readjust your expectations and timeline accordingly.	• Start with the end in mind and work backwards. If that is not practical, readjust your expectations and timeline accordingly.
Vision	• Your dream home	• Your school or district's concept of how technology can successfully support teaching and learning
Goals	• Beauty • Comfort • Location • Resource efficiency	• Technology is adequately supported as a tool for teaching and learning. • There is a continuing flow of resources to support technology integration.
Activities	• Deciding on the final plan and design • Hiring a builder • Acquiring the financing • Selecting interior and exterior materials • Designing special features • Building the house • Approval and final walk through	• Planning to plan • Creating the committee • Gathering planning resources • Writing the plan • Implementing the plan • Evaluating
Ongoing	• Repairs and improvements	• Repairs and improvements

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Tools in this Chapter

As a result of our work at various school sites over the past few years, we have found several valuable tools that are particularly useful in helping districts and schools create strategic educational technology plans. We have included those tools along with some firsthand examples and stories from schools that used them.

The Big Picture. *The Big Picture* is a tool that demonstrates the relationship between vision, goals, activities, and the technology infrastructure.

Components of the Planning Process. To get you started, we've provided *Components of the Planning Process*. This will help you identify the various roles and responsibilities of planning team members and suggest materials you might find useful.

Forming Your Technology Planning Committee. The *Forming Your Technology Planning Committee* worksheet can be used to identify the most important roles that committee members must fulfill (i.e., have expertise in). It also reminds you of the various constituencies that you can draw upon when creating the committee.

Planning a Timeline. A timeline for planning will help you map out the time required for the various phases of the planning process. The timeline suggests allowing eighteen weeks for creating a strategic technology plan.

Components of a Good Technology Plan. The list suggests areas to be considered and included in your technology plan.

Sample Technology Plan Outline. The outline is a distillation of a common technology plan structure and includes the components of a good technology plan.

Technology Needs Survey. The survey is a model for a comprehensive technology needs assessment, but it is more than an inventory of computers and software. This will help you know what you have, how it is being used, and where it is located in the school or district.

Technology Inventory Worksheet. If you haven't already done so, use the *Technology Inventory Worksheet* to collect this type of information. These tools are also useful in collecting evaluation data for those who already have a technology plan. If your district is thinking about teacher and student competencies as a goal, or is mandated to adopt or create competencies, we've included information on technology competencies in Chapters 3 and 4.

Core Values Worksheet. Since we strongly believe that the vision is the cornerstone of any good plan, we have provided some pointers and activities, including a *Core Values Worksheet,* for *Creating the Vision Statement*. Your committee of stakeholders can use these for developing a comprehensive vision statement that motivates and guides your plan.

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Sample Vision Statements. We have provided a range of *Sample Vision Statements* to show you where other schools have taken the vision-setting process.

Creating Goal Statements. Once you have a vision and you know where things currently stand, it's time to articulate goals. *Creating Goal Statements* offers a brief guide as to what should be included in an educational technology plan goal statement.

Sample Goals. We've included some *Sample Goals* that can guide you in creating your own goal statements.

Action Plan Worksheet. Creating an action plan helps you relate the planned activities to specific planning goals. We have included the *Action Plan Worksheet* to help you complete this process successfully.

Defining Activities for Your Action Plan. We have included a simple set of guidelines that will assist you and your various planning subcommittees in creating practical and realistic action plans.

Aligning Your Technology Plan. The framework will help you to check your strategic plan for consistency and completeness.

Technology Planning Resources. Finally, we offer a list of those online and print resources we have found particularly useful for technology planning. The *Technology Planning Resources* list is not designed to be one hundred percent inclusive of everything available online or in print, but it's a good place to start.

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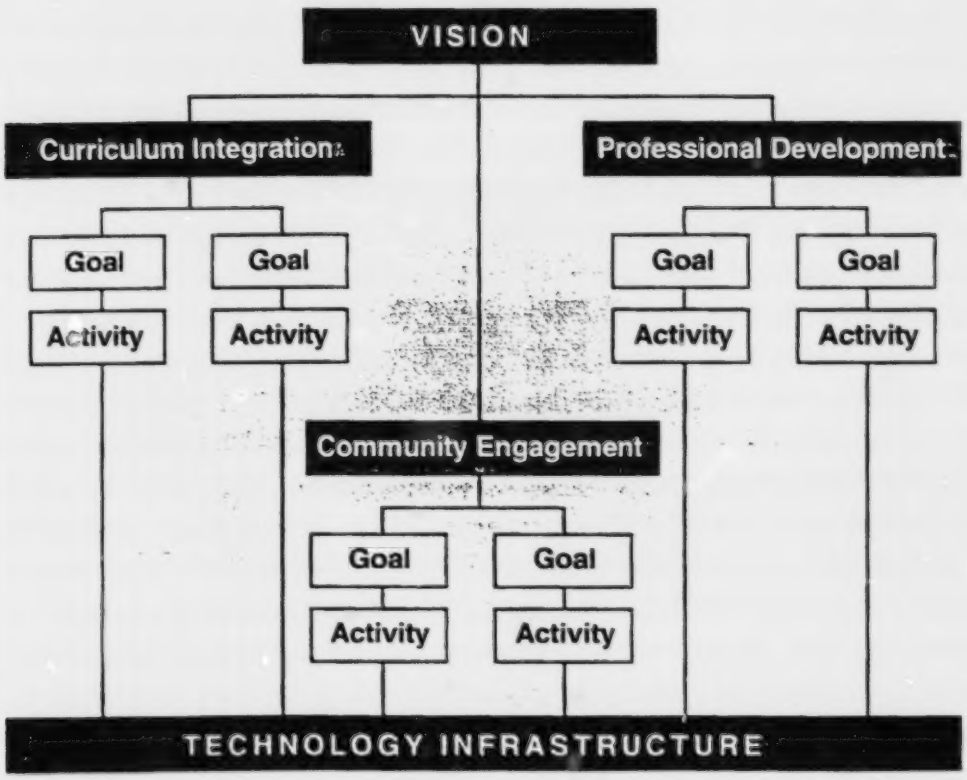
Building a Framework

The Big Picture

This picture of your overall plan is a helpful tool for reminding your committee members and other stakeholders that every action must relate to your vision. It also serves to remind you that it is the vision, not the technology infrastructure, that guides your plan.

The diagram below represents the interrelationship of the three key elements of a strategic educational technology plan. The goal groups shown in the diagram—*Curriculum Integration*, *Professional Development*, and *Community Engagement*—are the broad areas that your plan should include. Your plan may have some variation, and you may choose to have more or different major areas. Having a framework enables you to maintain a direct relationship of goals to your overall vision.

Every activity—regardless of exactly how many you might have—must link to a goal. Furthermore, each goal has to link directly to your plan's vision. *Technology Infrastructure*—wires, software, hardware—is subordinate to vision, goals, and activities. In other words, your plan is not about infrastructure. Rather, your plan should focus on vision, goals, and the activities that will support them.



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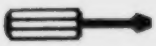
Planning to Plan



Components of the Planning Process

As you begin the planning process, think about three important components: the technology planning committee, research and information that will be resources for the committee, and time.

The Committee

- **Teachers.** The committee should include teachers from a range of grade levels and subjects representative of your school or district composition. Include non-teaching staff as well.
- **Administrators.** The presence of a few administrators on your committee helps to establish accountability and ensure that your efforts are on track with school, district, and state guidelines/objectives. To help keep the big picture, try to include district-level curriculum and professional development coordinators.
- **Parents.** Parents can be your most valuable allies.
- **Board members.** These are particularly important if your plan will need to be approved or funded by the local school board.
- **Students.** After all, they are the ultimate stakeholders!
- **Community representatives.** Remember your community consists of more than school staff, parents, and students.
- **Process People.** People who understand the planning process and are organized.
- **Committee chairperson.** Someone to keep everyone on track and on task.
- **Writer/editor.** Someone to polish your finished product and to ensure readability.
- **Administrative assistant.** There's a lot of paperwork to attend to, and someone needs to be responsible for taking meeting notes.

Research and Information

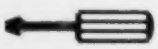
- Planning guidebooks and toolkits
- State and/or district guidelines
- Copies of state/district curriculum frameworks
- Sample plans from other districts—preferably from within your own state
- Visits to other schools/districts to see how they have implemented technology as a tool for teaching and learning
- Examples of lesson plans/units demonstrating how technology can be integrated within the existing curriculum

- Workshops, courses, institutes, and other staff development that relates to technology integration, strategic planning, and/or state guidelines for technology plans

Time

A minimum of four months from start to finish, with a clear understanding that the process is quite likely to take longer. Based on our experience, most districts may need closer to half a school year to complete the plan.

Forming Your Technology Planning Committee



Stakeholders are people who have a keen interest in technology planning because it will impact their work or interests. Stakeholders are also those who have expertise that is important for the planning, implementation, and integration processes. To write your school technology plan, you need a committee composed of educational-technology stakeholders *who will actively work* to help write the school's plan. Keep in mind:

- Your committee members should represent all aspects of your school community. This means teachers (from a variety of grades and/or subject areas), administrators, parents, community members (e.g., business people), and perhaps students. Refer to Chapter 5, Community Engagement, for possible community members who can contribute to your planning committee.
- While working by committee may be burdensome, resist the temptation to form a committee of only one or two people. On the other hand, avoid committees that are too large and unmanageable.
- Since the planning process contains many different tasks, you will need members with a variety of skills: curriculum design, professional development, technology infrastructure expertise, and experience with budgetary matters, administrative policy, and process tasks.
- Committee members need to understand that planning, implementation, and integration are ongoing processes, not short-term commitments. The committee members should be willing to assist in your school's technology implementation efforts long after the actual plan is written.
- You can use the following worksheet when forming your planning committee. A blank, reproducible copy is included in the Appendix.

Appendix SEIR•TEC

Forming Your Technology Planning Committee

Expertise	Technology Planning Committee			
	Teachers	Administrators	Parents	Others
Curriculum Design	Mary Burns (11th SS) Rob Lester (3rd)	Ed Martin (HS principal)	Charlie Parker Dee Smith	
Professional Development	Kathy Quinn (6th Language Arts)	Diane Tabor	Andy Carell	
Technology Infrastructure	Roger Harte (10th Science)	Herman Jahn	Will Fence Lois Simpson	Stephanie Lee (owner, CompuMart)
Fiscal and Budgetary		Tom Burton		Claire Stanford (Board member)
Policy	Julie Jones (4th)	Martha White (Supt.) Ted Wallace (Asst. Supt.)		
Process Tasks (Writing, calling meetings, etc.)		Sue Tucker (MS principal)	Donna Michaels (accountant)	Joe Cavazos (editor)

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Planning into Practice

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Planning a Timeline

Following is a broad timeline of what you will need to do for planning, when, and how long it will take. A blank, reproducible, copy of the worksheet is included in the Appendix. We have to note that this eighteen-week timeline is considerably more optimistic than what most districts are able to accomplish.

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SEIR•TEC Appendix

Technology Planning Timeline

Week 1	*Choose and notify committee members.*
Week 2	*Finalize committee appointments, and announce first meeting.*
Week 3	
Week 4	*Hold first committee meeting to orient members to process, overview process, and begin to set vision.*
Week 5	
Week 6	*Second committee meeting to finalize vision. Create subcommittees by goal groups.*
Week 7	
Week 8	*Subcommittees meet to fix goals.*
Week 9	*Entire committee meets to review/revise goals.*
Week 10	
Week 11	*Subcommittees create action plans/items within goal groups.*
Week 12	
Week 13	
Week 14	*Entire committee meets to review progress and subcommittee work.*
Week 15	*Subcommittees finish their work and turn products over to writers/editors to compile into a final draft.*
Week 16	*Writers/editors compile sections, write unifying pieces, work on graphics.*
Week 17	*Distribute final draft to entire committee for review.*
Week 18	*Hold final committee meeting to approve the draft for distribution.*

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Weeks in which there are no named activities allow time for completing the work necessary to move the plan to the next step. While it is highly likely that certain steps will take *longer* to complete, it is very unlikely that steps can be completed in less time than is shown.

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Components of a Good Technology Plan

There is no single best model for an effective technology plan. You will find a number of templates, checklists, and frameworks to help guide your work. Our experience indicates the best plan is one that suits local priorities, is closely linked to its district's instructional goals, and is developed by a broadly representative planning group. As with any educational innovation, it can take as long as five years for improvements (including technology implementation) to impact student achievement measures. Therefore, most technology plans are designed with goals and objectives that extend over a five-year period. Included are the activities that will take place within that time and the sources of funding that will support that plan.

We have selected several key items that you will want to include in your technology plan, along with applicable goals and objectives. We direct you to the sections in this book where you can get more information regarding these various items.

A vision statement. An effective technology plan begins with a vision statement that focuses on learning goals and outcomes. This chapter includes steps and activities that you and your planning team can use to create that vision statement.

An assessment of current technology use in your district. Where you are and where you want to be. This information provides a baseline for planning and implementation. We have included some survey forms in this chapter for carrying out this assessment.

Curriculum integration. Curriculum integration involves curriculum goal-setting, infrastructure planning, and professional development planning. These may be stated broadly, or you may prefer to list specific outcomes by grade level. (See tools later in this chapter for creating vision, goals, and action plans.)

An evaluation plan. Once you start to implement the technology, how will you evaluate its effectiveness? You will want to assess all elements of your technology initiative—from teachers' instructional use to the effectiveness of local policies regarding access, training, and support.

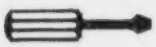
Equitable—and practical—access for teachers and students. What is your strategy for providing technology access to teachers and students? Do you have provisions for an Acceptable Use Policy, especially for the Internet? Chapter 6 presents various classroom models for creating student and teacher access.

Professional development. Teacher training is one of the most important elements in a successful technology effort. If teachers do not have the understanding or the skills to use technology, then technology integration will have little impact. Chapter 4 describes the pros and cons of various strategies that address not only basic technology skills, but also changing instruction and integrating technology into daily classroom activities. How do you plan to deliver the necessary professional development? Suggestions for developing a staff development curriculum are also included.

Community engagement. Community engagement should not be an afterthought to technology planning. In fact, it is a crucial component to success. You should recognize that your community includes everyone in your school district—board members, administrators, teachers, support personnel, and students, as well as parents, business leaders, and others who are directly or indirectly associated with your schools. Chapter 5 discusses ways to communicate your technology plan to the community and to secure community support and participation.

Infrastructure. Infrastructure is a complex area of technology planning; here we break it into four main categories.

1. **Specifications for hardware and software acquisitions.** The software (instructional materials and applications) that best suits your school or district's instructional needs should determine hardware (equipment) purchases. Compatibility and ease of use are also important considerations. Focusing on cutting-edge or specialty items can be a waste of resources, unless they address a specific need. This is an area in which an external consultant can be invaluable. Chapter 6 will help you create a set of realistic goals and objectives.
   - *Networking and multimedia access.* Items in this category may include wiring and cabling, provisions for a local area network, Internet services, and access to cable or satellite television. This is another area where an external consultant can be of great help.
   - *Facilities modification and other infrastructure supports.* If you are building a new facility, plan to include access to telecommunications and networks. Or, if you have older facilities, consider the need to add electrical outlets or telephone lines, or to adapt heating, cooling, and ventilation systems. You may also need to add or remove carpeting, alter acoustics, or repair a leaky roof.
   - *Safety and security measures.* This may include not only concerns about physical safety and protecting equipment and supplies, but also provisions for assuring the security of student records, teachers' files, and so forth.
   - *System maintenance, troubleshooting, and technical support.* This is another critical but often-neglected topic.
2. **Assessment of your infrastructure.** Technology systems and software will become outdated and equipment will wear out. While you don't need to keep up with every technological innovation, your technology planning process should include provisions for regular review.
3. **Budget summary and funding strategies.** Funding your technology plan is an important piece of your total plan. Chapter 7 provides many resources for external funding as well as tips on how you can maximize your local revenue streams.
4. **Timeline.** You will need to develop several timelines for carrying out different parts of your technology plan. Don't forget to include those timelines in your technology plan, too. We have incorporated timelines in this chapter and in various other survey and assessment forms throughout this book.



Sample Technology Plan Outline

The following sample outline of an educational technology plan is intended to show the various sections and flow of a typical plan. You need first to check with your state or district technology administration to determine if there is a particular format that your plan must follow. Often it is acceptable to have more than the state requires, but it is never acceptable to leave out a state-required section. As long as your planning committee follows state and local guidelines, they might decide to vary the actual order of sections, or even add sections.

Sample Technology Plan Outline

I. Executive summary/Introduction

II. Our school's vision for educational technology
   - A. Why are we interested in using technology?
   - B. How will technology impact teaching and learning in our school?

III. Current status of educational technology in our school

IV. Planning focus areas
   - A. Curriculum integration
     1. Overview of our curriculum integration strategy
     2. Goals and objectives
   - B. Staff development
     1. Overview of our staff development strategy
     2. Goals and objectives
   - C. Community engagement
     1. Overview of our community engagement strategy
     2. Goals and objectives
   - D. Infrastructure
     1. Overview of our infrastructure strategy
     2. Goals and objectives

V. Technology infrastructure design

VI. Equitable and practical access for teachers and students

VII. Action plan by year (for five years)
   - A. Curriculum integration
   - B. Staff development
   - C. Community engagement
   - D. Infrastructure

VIII. Roles and responsibilities

IX. Budget summary/Funding strategies

X. Evaluation

XI. Appendices—Committee membership, Inventories, Survey data, Glossary, Bibliography

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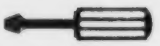
Technology Needs Survey



The *Technology Needs Survey*, developed for the SEIR•TEC intensive site schools is designed to determine teacher needs and attitudes related to instructional technology. You may find that some of these questions do not apply to your situation; in that case, you would want to customize it for your own needs before administering it to your district's staff. You will find a reproducible instrument in the Appendix.

Administering this survey *early* in your planning process can help you accumulate valuable data on the current status of technology implementation and integration in your school or district. You will need a comprehensive picture of how teachers currently think about and use technology in their teaching. After you gather this information, you can use it as valuable *baseline data* to measure your progress in future planning years. Administering this survey again after a year or two will inform you of changes or additional activities you need to undertake. If you have already begun implementing technology in your school or district, this survey may be useful for measuring the progress you've made. Whether you use the SEIR•TEC survey, or create your own, these are the areas of information that should prove useful:

- What types of activities do teachers use with educational technologies and how often do they use those activities?
- Do teachers have access to a computer for their own use, or do they routinely use a personally owned computer to prepare materials for use in their classrooms?
- What ideas does the staff have about what is needed to make technology more useful?
- What student benefits have the staff members observed in relation to the use of technology in the school/classroom?
- What new software or hardware do teachers frequently request for use in classrooms?
- What are examples of special work or projects teachers and students have done with technology?
- Which courses or subjects most often use technology?
- Who supervises and assists students in the use of computers?
- Who assists and supports technology problems within schools on a daily basis?
- Who handles major technology problems that have come up regarding the use of technology in the school/classroom?
- What is the type and frequency of participation in educational technology professional development in the previous two years? What effect has it had on instructional practices?

- What hardware and software are available in the school or classroom? Don't overlook existing networks, TVs, VCRs, Channel 1, laser-disc players, scanners, digital cameras, access to the Internet, and so on.
- What are the levels of technology experience of teachers and other staff?
- What new professional development do teachers and staff members frequently request?

Technology Inventory Worksheet

Before you create a want list, be sure to inventory what you already have on hand. You might be surprised at what currently exists in your district. Often

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Appendix SEIR•TEC

Technology Inventory Worksheet (page 1 of 2)

Operating systems

Mac OS 7.5 on all elementary school machines.
Mix of Windows 3.X, 95, and 97 in middle and high school.

Computers: include manufacturer, processor type and speed, capacity of ROM, capacity of RAM, CD drive, networked, standalone. See district property and inventory report for details.

Bridge Elem-2 Mac 5200 labs (10 machines each)
Misc. Apple IIe machines around building
Hastings Elem-1 Mac 5200 in each classroom
Misc Apple IIe machines around building
JFK Middle School-PC Lab (20 486 machines)
PC workstations (386 and 486) in principals office and LMC
Central High-English/Writing Lab (15 PCs)
Library (10 PCs, Internet-connected)
Science/Math Lab (20 PCs)
Business Lab (20 PCs)

Peripherals

Scanner
Zip drive
External CD-ROM
Printers
See district property and inventory report for details.
One laser printer in each lab (across district), misc. inkjet printers throughout buildings.
Scanner in Bridge Elem. school lab.

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teachers or principals have gained access to some computer technology through special projects or other funding. Sometimes a teacher or administrator who is no longer with the district may have purchased technology that now sits unused and forgotten. A reproducible worksheet for this technology inventory is included in the Appendix. You may want to modify it for your own use.

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SEIR•TEC Appendix

Technology Inventory Worksheet (page 2 of 2)

Other

Digital cameras
TV monitors
Display devices
Video projector (??) at High School
Digital camera at Hastings Elem. (ask Ms. Stewart-LMC specialist)

Networks: Local or Wide Area

Dedicated Internet connection in HS LMC
One dial-up connection (using modem) in all other buildings
Computers in HS labs are "ethernetted" (??)
Computers in elem labs are local-talk networked

Telephone access

BellSouth

Internet access

Provider: Free NetAccessNet connection for HS. Plans to add at other buildings.
Browsers: Netscape in elem. schools. MS Internet Explorer at middle and high.

E-mail provider

AOL, HotMail, Yahoo mail, etc. No district-wide e-mail service. Each teacher responsible for his/her own account. No e-mail for students.

Software applications

AppleWorks 4.0 on each Mac.
MS Works on each PC. Some PCs have MS Office 98 (but we don't know where this came from!!)
All other software is owned by individual teachers. Not registered to district.

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Identifying Core Values and Creating a Vision Statement

A well-defined vision statement is the cornerstone of any good plan. Before the planning committee starts drafting goals and objectives, it should first define or describe its vision for technology. This vision should reflect your district's core values as they relate to educational improvement and the role that technology will play in helping support those values. We suggest that you conduct brainstorming sessions such as those described below to develop your vision statement and identify your core values.

Activity 1 Brainstorm to develop a vision.

Introduce the activity with the following:

> *The overall goal of a strategic educational technology plan is to lay out an operational plan for using technology to enhance teaching and learning. It is expected that the process for implementing technology will not be instantaneous or finite. Rather, technology integration is an ongoing process, throughout which we should be able to look back and see definite changes and growth. If the plan has been successful, the changes and growth will have followed the basic structure—the goals, objectives, and timelines—of the technology plan. As a technology planning committee, your task is to write that plan.*
>
> *To help us develop a picture of what our district will look like as this technology plan is implemented, imagine one of our schools five years from now. Specifically, think about a student who is attending that school. As you imagine a day in that student's life, identify the ways that technology touches the student's experience in the school.*

Brainstorm images that help you see technology being used to:

- Support new ways of teaching and learning
- Expand learning beyond the walls of the traditional classroom
- Support teachers in their instructional tasks and professional learning
- Bring the school closer to its parent community
- Make more efficient use of teacher and administrator time and resources

Write these ideas on a flip chart and refer to them later when you create your vision statement.

Activity 2 Identify core values.

The *Core Values Worksheet* activity is useful for helping your committee identify core values that support your common vision. A reproducible version of the *Core Values Worksheet* is included in the Appendix.

In the *Core Values Worksheet* you are asked to describe why you believe that technology is a necessary tool for teaching and learning in this district. The worksheet also asks you to describe in broad terms your core educational values and the ways in which technology will impact student learning and to discuss your commitment to making sure that students, teachers, administrators, and your entire educational community have access to technology tools.

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Core Values Worksheet

Instructions: Use the spaces below to list five reasons why technology is important to the students and teachers in your school. Start by thinking about how technology can impact and improve student learning.

Technology is important to students and teachers because:

1. *Technology gives all students greater access to knowledge and information.*
2. *Technology provides students with more ways to manipulate, interpret, and present information.*
3. *Technology is a catalyst for creativity, collaboration, and cooperation. It enhances creativity.*
4. *Technology provides students with "real life" tools to solve "real life" problems.*
5. *Technology allows our teachers to spend more time teaching and less time record-keeping.*

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Use this tool to catalog the core values of your district or school—paying particular attention to how these values relate to technology's role within the teaching and learning environment. Make sure that your vision statement reflects these core values.

Each person on your planning team should complete the worksheet individually, and then a facilitator should work with the entire group to reach consensus on the core values for your campus or district. Once expanded upon, these reasons can form the basis of the vision statement of your technology plan.

Activity 3 Create the vision statement.

Once you have completed the brainstorming activity and have identified core values, your school technology planning committee can begin to work on your vision statement. You may use the statements from the brainstorming and core values activities to stimulate conversation and spur additional thoughts about why your school needs to integrate technology in its teaching and learning environments.

The vision statement should result in a single, concise paragraph that summarizes your answers to the questions "Why is technology important to the students and teachers in our school?" and "Why do you believe that technology is a necessary tool for teaching and learning in this district?"

As you start work on your vision statement, it may be useful to examine vision statements of other schools and districts. As you will see, there are many different interpretations of what constitutes an appropriate vision statement. One thing that is consistent across all of these statements is that their bottom line is an expression of how technology will be used to impact student learning and achievement.

We have included portions of the vision statements from plans of several of the SEIR•TEC intensive sites and other schools with which we have worked. You may wonder why you cannot just adopt a vision statement that someone else has generated. The point is that the vision statement should reflect your own situation, values, and context. For many it may be the process of jointly *creating* the vision that makes it a useful guiding light to your own plan. The vision-setting process can help get your committee all on the same page, which will certainly be invaluable in fulfilling that vision down the line.

We suggest that you postpone reading the examples that follow until the latter part of your vision-creation process, and do so as a reality check. You will notice that some of these schools have lengthy vision statements; be aware, however, that the value of a vision statement is not determined by its length. And, most importantly, remember that your vision statement will be unique to your own school or district.

Sample Vision Statements

Lakeside School District

Our Vision for Educational Technology

It is the vision of the Lakeside School District that all students and faculty be provided with the latest technology tools and training so that they can function in society and be competitive in the global market. We envision that students will develop the necessary skills to be productive members of society. Technology will support this development by refining their critical thinking skills, enabling effective communication, and fostering creativity.

Lakeside School District is committed to providing ongoing and continuous training to all of its teachers in the use of and integration of technology tools. To ensure equity of learning, these tools will be made available to all students in support of their varied learning styles and needs by providing faculty access to state of the art information and resources.

To achieve our vision, the Lakeside School District will enlist the active engagement of our parents and community and offer the technological resources of the schools.

Lincoln High School

Vision for Educational Technology

Technology offers students an avenue to succeed as citizens in a global society in which information is growing at an incredible rate. Technology can improve communication, enhance thinking skills, make instruction more efficient and effective, and develop life skills critical to success. Lincoln High School will incorporate technology as a means of integrating curriculum across subject areas. Students and educators will be guaranteed opportunities to use technology as an integral part of education. In support of this vision, Lincoln High School offers its Strategic Educational Technology Plan.

Ricardo Richards Elementary School

Vision

As an educational institution, Ricardo Richards School is committed to ensuring that all students and staff acquire the knowledge, skills, and attitudes necessary to be lifelong learners.

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Rosemary Middle School

Our Vision for Technology Integration

Students, parents, and educators will use communication and information technologies to enhance and expand the traditional role of education in the Andrews community. We believe the basic goal of education has not changed, that is, to prepare our students for life-long learning and success in a changing society. However, the tools and instructional methods to achieve these goals have advanced dramatically. Technologies such as computers, networks, and wide-area communications offer tremendous opportunities to students and educators as a way to improve life within our community and a link to the world outside of Andrews. Rosemary Middle School has the responsibility for developing curriculum and applying instructional methods enriched with technology and in ensuring that our students and teachers are proficient users of these new technologies. This technology integration plan will outline our strategies for turning this vision into reality.

Groton Public Schools

A Vision for Technology

We envision using technology to further a learning community where:

- Students are engaged in a challenging curriculum that is focused on inquiry-based, hands-on learning. Students are comfortable using technology. Students take responsibility for their own educational success.
- Teachers use technology to support all learning across the curriculum. They function as coaches, mentors, advocates, and managers of information. Through ongoing, comprehensive professional development, all teachers acquire the knowledge and skills to integrate technology into a challenging and interdisciplinary curriculum that addresses students' specific needs, developmental levels, and learning styles.
- Administrative functions, including those performed by instructional staff, are fully automated, thereby allowing more of the school system's energy and resources to be focused on student education.

The schools become an environment where all students and staff have ready access to a full range of current technology, software tools, and applications. The schools have knowledgeable staff and external resources (such as parents, community members, business, higher education, and network resources) to further the curriculum goals.

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Whiteville City Schools

Vision

The vision of Whiteville City Schools is to provide all students with access to state-of-the-art information technology that will assist them in:

- becoming proficient in reading, writing, mathematics, and critical thinking,
- being prepared for the next level of education, and
- successfully attaining the skills and proficiencies required of today's work force.

In addition, all administrators, teachers, and district/school staff will use technology daily to effectively help students attain high standards and prepare for tomorrow's world of work.

Why Technology?

In the twenty-first century, understanding and using technology will be an integral part of virtually every aspect of daily life. It is the school system's responsibility to prepare students for this future. The classroom is the primary place where this preparation will occur; therefore, every classroom must be equipped with diverse technologies to support teaching and learning. Every teacher must be knowledgeable and skilled in the use of these technologies in daily instruction. When integrated into instruction, technology will support new strategies for teaching and learning by:

- addressing diverse learning styles,
- accommodating individual learning rates,
- encouraging cooperative learning,
- helping students accept responsibility for their learning,
- providing the means to communicate globally, and
- improving academic achievement in all areas.

The use of technology in instruction changes the structure of the classroom. No longer will the teacher rely solely on the traditional lecture/seatwork method of instruction. In a technology-rich, learner-centered classroom, the teacher serves as a facilitator of instruction, mentor, and coach. Technology will provide a record of the student's academic history and ways to manage learning progress and activities. Teachers have the data and information needed to individualize instruction and assessment as well as make other important instructional management decisions. Through technology, teachers and students will access a wealth of materials, services, and networks throughout the state, nation, and world. Technology does not replace the teacher, but rather supports and enhances the educational process.

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Creating Goal Statements

Once you have created your vision statement and your planning team has a focus for its direction, it's time to create goal statements.

What Is a Goal Statement?

Goal statements are the specific pieces of the plan that support your vision. For technology planning, appropriate goal statements should be created for these three broad areas:

- Curriculum integration
- Professional development
- Community engagement

Other areas are possible if they fit your situation. Also, remember that you *must* abide by the structure set for technology plans by your state department of education. If this structure requests a particular focus area, then you must create goals for that area.

Goal statements describe what you want to accomplish. While your vision statement might not change over a period of time, your goals might change. School districts may have similar vision statements but the goals that support their vision may be quite different.

Goal statements, however, do not describe *how* a goal will be reached. *How* things will get done is described in an *action plan*. Tools and formats for creating action plans follow the sample goals.

Sample Goals

Curriculum Integration

In general, most technology plans have three basic goals related to technology integration:

- A goal that describes technology as **supporting the core curriculum and/or state curriculum frameworks.** Most districts choose to support this goal with one sample activity illustrating how technology would be used within each core curriculum area.
- A goal that describes technology **as supporting learning and thinking skills for all students,** such as inquiry, critical thinking, problem solving, and creativity. Most districts support this goal with three activities, that is, one activity illustrating how technology would be used at elementary-, middle-, and high-school levels to support these skills. Plans might also specify technology and learning activities for special populations, such as students with disabilities or those who speak English as a second language.
- A goal that describes **technology expertise as a critical skill** that prepares students for a technological future. This goal touches on how and why

students become effective and efficient users of technology. Most districts develop several activities that support this goal.

You may find it useful to review some of the materials and resources in Chapter 3 for examples of how technology supports learning. Following are some sample goals:

- Our students will learn to solve problems cooperatively through teamwork, assisted by appropriate technologies.
- Our students will develop an appreciation for and the ability to use technology in problem-solving situations.
- Our students will have opportunities to work with voice, video, and data technology in an atmosphere conducive to their varied learning styles.
- Our students will have equitable access to computers and other technology tools where instructional needs are best served.
- Our students will be provided with a range of experiences designed to develop the technological skills necessary to function responsibly in life situations marked by rapid technological change.

Professional Development

Professional development is the training and development needed by teachers and administrators to use technology tools within teaching and learning environments. Be sure to include goals that relate to learning new, technology-supported pedagogical approaches as well as the mechanics of hardware, software, and network operations. As we detail in Chapter 4, teachers not only need to know how to use technology effectively, they also need to understand reasons for using technology. Your professional development goals should address both the how and the why of teaching and learning with technology. Some examples follow:

- Our teachers, administrators, and staff will participate in professional development as necessary to make them proficient technical users of the district-wide network, its resources (such as e-mail and online information collections), and other technology devices and resources.
- Our teachers will participate in professional development as necessary to develop pedagogical techniques and strategies to facilitate learner-centered, project-based curricula that integrate the use of technology tools.
- Our teachers and staff will be provided with adequate time to take advantage of professional development opportunities related to learning technology skills and strategies.
- Our teachers will be provided with time, incentives, and opportunities to share their individual technology skills and expertise with other teachers in their schools and around the district.

Community Engagement

Schools and their communities are mutually dependent. All too often, schools forget that they can both obtain tremendous resources from their communities *and* put back as much as they gain.

As we detail in Chapter 5, your plan's community engagement goals should express this give-and-take. These goals are designed to address the many ways that your schools can draw support from your community of stakeholders and at the same time serve as rich resources to a diverse community.

Here are some examples:

- Our ongoing technology planning process will address the needs and concerns of a wide range of school and community stakeholders, including teachers, administrators, school staff, parents, students, local business and industry, and community service providers.
- We will operate and maintain our technology infrastructure in partnership with the local community.
- We will create information on our wide area network that is useful and relevant to a diverse range of users, both within and outside the school-system network.
- We will provide opportunities for teachers, students, administrators, and community members to use technology resources at school and in other locations throughout our community

Taking Action

Creating an Action Plan

Once you have stated your goals, the next step is to determine how you are going to achieve them. For that purpose, you need to have an action plan. Creating individual action plans for each goal can become quite complicated, since you need to determine *what* it is exactly that you need to do to support that goal, *who* will be responsible for carrying it out, *when* an activity needs to be completed, *what* resources are required, and *where* the activity will take place.

Furthermore, some activities will depend on the completion of another activity. It may be helpful to create a flowchart or diagram to show how all of the action plans relate to each other, to each of the goals, and to the vision statement.

Many tools are available for accomplishing this task. Check the *Technology Planning Resources* section in this chapter for different templates, rubrics, or matrices that you can use for this process.

A reproducible form of the following worksheet is included in the Appendix. You will need to create a different template for each goal and the activities related to it. The sample that follows shows how this template can be used.

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SEIR•TEC Appendix

Action Plan Worksheet

Goal Group: *Professional development (Grades K-5, 2000-2001 school year)*

Statement of Goal: *Our teachers will participate in professional development as necessary to develop pedagogical techniques and strategies to facilitate learner-centered, project-based curricula that integrate the use of technology tools.*

Activities	Responsible person	Begins /ends	Hardware/ software required	Other resources required	Professional development required	Budget allowed for this activity
Cooperative learning state-wide seminar series (K-5)	*Elem. Curriculum Coordinator & Consultants*	*6/99 -8/99*	*none*	*Need to coordinate with district prof. dev. plan!*	*Participants read familiarity with K-5 curriculum frameworks*	*Stipends and consultant fee; pay from PD grant*
"One Computer Classroom" workshop (K-5)	*Elem. Instructional Tech Specialist*	*10/99 -2 weeks*	*Elem. School Mac Lab, AppleWorks, LCD projector.*	*Make sure participants actually have a classroom computer!!*	*Participants must have taken cooperative learning workshop during previous summer.*	*Tech budget for IT specialist's salary. No stipends.*

Evaluation

- *Participants in seminars and workshops will complete evaluation forms.*
- *Participants in summer seminar will keep a journal of their thoughts and impressions during the series.*
- *After the "One Computer Classroom" workshop, participants will submit lesson plans showing technology-supported curriculum units to Principal and Elementary Curriculum Coordinator.*

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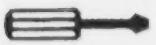


Defining Activities for Your Action Plan

Appropriate activities within your action plan should allow you to answer YES to each of the following questions:

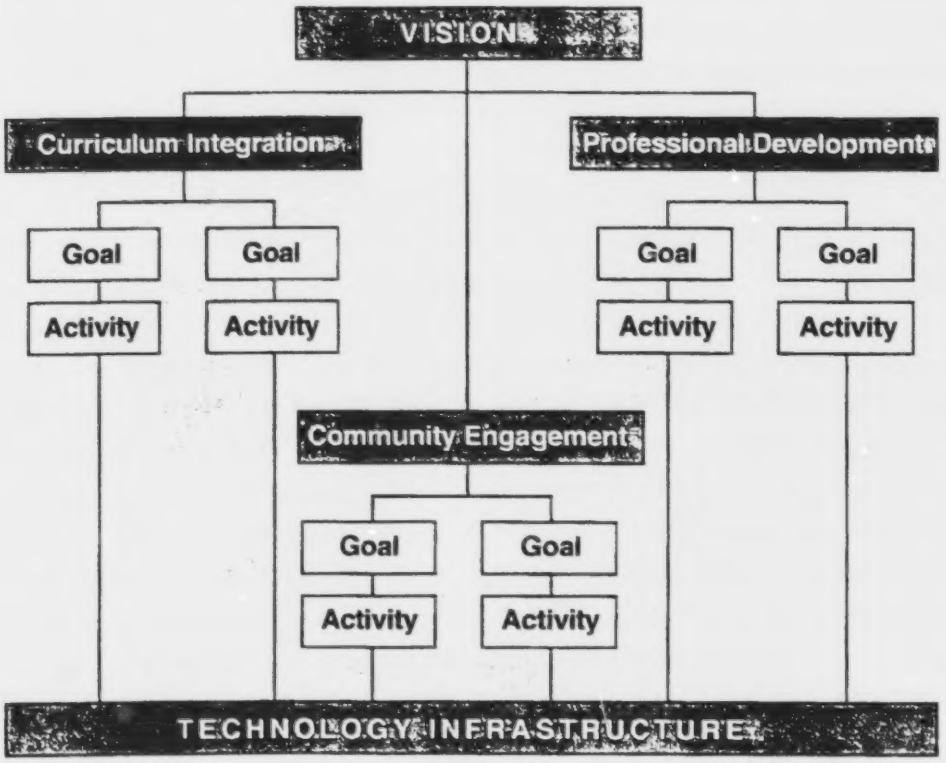
- **Does this activity *directly relate* to at least one of your goals?**
  Remember that you should not have goals that do not support your vision, and you should not have activities that do not support goals.
- **Is this activity *critically important* to accomplish or fulfill the goal it supports?**
  If you do not perform this activity, would you be unable to accomplish your goal? It is important to choose activities which have a clear relationship to the goal and which create sustained and measurable impact in terms of the goal.
- **Is the activity do-able?**
  Do you have the resources—financial, human, and time—to accomplish this activity by the end of the time period you have specified? Have you accounted for all of the resources—time, hardware/software, staff development, funding—that you need to accomplish this activity?
- **What impact will the activity have on related activities in years to come?**
  Is there anything about this activity that would prevent you from performing other related activities beyond year one of your plan? For example, is this activity so expensive that you would deplete all of the funds that might be designated for such activities? Is it an activity that needs to be ongoing?
- **Does this activity build upon other activities and initiatives undertaken within the district?**
  Certain activities—particularly those related to professional development, curriculum revision, and infrastructure development—should be linked to district initiatives much broader than those discussed directly in this technology plan. Examples might include building renovations, district reform plans, and professional development plans. It is to your benefit to be aware of and to build upon those other district initiatives.
- **Is this a *measurable* activity?**
  How will you evaluate this activity? Are there data you can identify and collect which will allow you to document your progress and/or success in accomplishing the activity?

  A handy way of summing up these rules is to apply the SMART test. That is, are your activities:

  Specific?
  Measurable?
  Attainable?
  Relevant?
  Time-Bound?

Aligning Your Technology Plan

The framework introduced on page 25 is useful for checking the alignment of the various sections of your plan. For example, does your vision talk about curriculum? If so (and it *should*), what plan goals relate to that part of your vision and what action plan steps relate to fulfilling those goals? Is there overlap or duplication between efforts? Can some areas be consolidated or linked together? What efforts depend on other efforts? Have you forgotten something? By using such a tool, you can often spot inconsistencies between various elements of your plan and know where the plan needs more work. This framework is also useful for updating your plan periodically.



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Resources

Technology Planning Resources

There are many resources available for technology planning that can be found online (on the Internet) or in print. If you have not checked for resources yet, you might want to start with these.

Online Resources

http://www.scirtec.org/techplan.html
This SEIR•TEC web site has a number of resources to assist you with your technology planning. We offer links to sample plans from schools across our region and to readings and tools offered by other institutions.

http://www.wested.org/tie/techplan/
TechPlan is a technology planning toolkit created by WestEd. This resource contains a number of reproducible tools (in PDF format) as well as text describing how each tool might be used as part of an overall strategic educational technology planning process. Of particular note are the many excellent matrices and templates that take a slightly different, yet complementary, approach to the tools we've provided in *Planning into Practice*.

http://www.swcouncil.org/switch2.stm
The Switched-On Classroom technology planning guide, produced by the Massachusetts Software Council, was one of the first comprehensive educational technology planning guides. Recently formatted for the WWW, the Switched-On Classroom guide offers a good, basic picture of the issues and processes involved in the creation of a school technology plan.

http://www.ncrel.org/tandl/homepg.htm
Learning through Technology is an online planning guide produced by NCREL (North Central Regional Educational Laboratory).

http://www.ncrel.org/sdrs/edtalk/toc.htm
The online version of *Plugging In* is a readily available version of NCREL's excellent think piece for educational technology planners. *Plugging In* helps planners organize their thoughts according to the kind of technology they wish to introduce into their schools.

http://www.nctp.com
The National Center for Technology Planning represents the largest collection of online technology plans in a single location. This is a great place to see what other schools and districts have done.

http://www.wws.princeton.edu/~ota/disk1/1995/9541.html
Teachers and Technology: Making the Connection is an excellent report that details many of the issues confronting schools as they examine how to best integrate technology in their teaching and learning environments.

Print Resources

These print resources are particularly useful for introducing technology planning committee members to the issues, uses, and impacts of technology in education.

Bingham, Margaret H. 1999. Stories with Data and Data with Stories. *T.H.E. Journal (Technological Horizons in Education)* 26 (April): 20.

Boethel, Martha; Dimock, K. Victoria; and Hatch, Lin. 1998. *Putting Technology into the Classroom: A Guide for Rural Decision Makers*. Austin, TX: Southwest Educational Development Laboratory. Ordering information and an online copy can be found at http://www.sedl.org/tap/puttech.pdf.

Casson, Lucinda, et. al. 1997. *Making Technology Happen: Best Practices and Policies from Exemplary K–12 Schools for Teachers, Principals, Parents, Policymakers and Industry*. Research Triangle Park, NC: Southern Technology Council. An online version or ordering information for personal copies can be found at http://www.southern.org/makingte.htm.

Collins, Allan. 1991. The Role Of Computer Technology In Restructuring Schools. *Phi Delta Kappan* 73 (September): 28–37.

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Putting It All Together

A conversation on strategic technology planning

In this section, we answer some common questions about this topic by drawing upon our own experiences working with schools and school districts.

All things being equal, what's the most important thing a school district needs for creating an effective technology plan?
Great question! We think that there really are several most important things for creating an effective technology plan, but we'll choose what we think is *the* most important.

The most important ingredient for creating effective technology plans is good school leadership. Note that we said "school" and that we didn't say "district." While district leadership may be what's required to kick off a planning effort and to actually implement a plan once created, it's *school* leadership that provides teachers with the supports necessary to take the time to write the plan.

We've seen this in our previous work in the field. There are some sites where teachers are not provided with encouragement to participate in planning work other than minimal release time necessary to attend a monthly planning meeting. This is probably rooted in financial concerns—such as the inability to hire substitutes to provide teacher committee members with more meeting time. However, the result is that teachers begin to feel that their work is not valued and may focus on the negative reasons for planning, such as "we have to." On the other hand, in schools where committee membership is valued, members are positive about performing this task.

The important thing is that planning must be supported from the school level and administrators must honor and value the input from teacher peer groups.

So, what's the biggest challenge faced by technology planners?
Leadership is necessary to create a committee, and as we mentioned before, to simply get the members to meet. Beyond that critical initial step, good leadership means stepping back and letting the committee take on the responsibility for leading the process. Strong leadership is important for the visioning stage. At some point into the visioning, leaders need to step back and let the committee move forward on its own.

Another challenge to the planning committee is knowing that it will have its district's full support over the time that it will take to plan and implement technology. It is easy to let other priorities take over during the process with the result that momentum and interest are lost.

Leaders who simply demand that the plan get done and do not take an active interest in the progress of the work are likely to get an uninspired and not-so-great plan. So, once again we're back to the role of leadership and how it's essential to supporting effective planning.

Imagine teaching someone how to ride a bike. Training wheels and a supporting hand are usually necessary to get things moving. Often support is needed just to overcome the initial fear. This is the role of leadership in technology planning. But once the rider begins to get the hang of it—even if it's a wobbly and shaky ride—the leader needs to let go and let the rider take over.

Once the committee is on its own, the challenge in moving forward is really one of *knowledge*. Many committees stall out when it comes to writing goals, mostly because they have absolutely no idea what goals they should target in terms of technology use and integration. Finding this target is like finding your balance when riding that bike. Without the balance, you topple over. Without knowledge of technology's possibilities, a planning committee quickly runs out of steam and collapses.

You mention that the committee needs knowledge about technology use and integration. How does a planning committee get this knowledge?
There are lots of ways. Unfortunately, none of them is particularly easy. Based on our field experience, here are some observations and suggestions.

Often knowledge is provided by a core group of technology experts on the planning committee. While these members may not have in-depth expertise about hardware and software, they understand how technology can be configured and used in the classroom and within a school.

The rest of the committee should be careful not to rely wholly upon those experts, who can easily end up being the only functioning members of a committee and therefore writing the plan by themselves. Also, experts sometimes end up dominating a committee and alienating other members, even other experts who have different views. These are major problems!

So, we would have to say that tapping into the experts on your committee can require a delicate balance. While you need their knowledge, you don't want it to have a negative impact on the effectiveness of the planning process. Instead, you want to build the capacity of the committee as a whole.

Our suggestion is to develop *everyone* on the committee into an expert, instead of letting a few committee members assume that role. This is possible if you consider that work on the technology planning committee is a professional development experience. There is no reason why we should expect committee members to have extensive foreknowledge about technology. They need to take time to learn about a number of things ranging from planning to technology infrastructure to effective teaching strategies and curriculum integration. Opportunities should be scattered throughout the planning process for members to develop their knowledge and skills in both the process and products of technology planning. Developing an entire committee's knowledge base takes time and effort; and this time and effort need to be supported by school and district leadership.

Professional development for committee members can take a number of forms. Making site visits to other districts within their states and elsewhere in the region where technology is in use is a very effective way to learn how technology is being used in schools.

You should visit different types of sites. By this we mean that sites chosen for visiting don't have to be high-end or leading-edge in terms of technology and its use. In fact, if you visit such a place and come from a very disadvantaged, low technology-using district, you are probably just going to end up feeling discouraged about your own situation, and that isn't helpful. Instead, find a district with similar demographics but with a high use of technology. The point is, if the experience is different in every single respect, you may find it difficult to transfer any of the learnings back home.

If you can't visit another site in person, try a virtual online visit with an opportunity to ask questions of those at the site. There are also a number of videotaped experiences, often available from your Regional Technology in Education Consortium (R•TEC), Regional Educational Laboratory, or a national organization such ASCD. These videotapes can help committee members get a picture of what's possible via educational technology. Finally, obtain and read as much information as you can from both print and online materials. Ask questions and try to attend educational technology conferences.

OK, the committee has the leadership support and the knowledge base; what else do they need?

The committee members need to understand *why* they are doing this work. Of course this goes for anything that you want to do well; you need to have the proper motivation. Technology planning committees need to understand that their work goes well beyond the creation of the plan. Technology innovations require time to be accepted and so the committee needs to revisit and revise its plan accordingly.

In a way, this leads to the ironic conclusion that the product of planning is not really the plan, but the experience of planning. There's a great quote from Dwight D. Eisenhower: "Plans are nothing. Planning is everything." We agree. This really is the goal of technology planning. If the committee members ultimately come to understand this, then they can move into the future always ready to make the most of whatever benefits and challenges may be presented. On the other hand, if they believe that there is magic in the plan itself and that the plan will be implemented as written, then they're in for continual disappointment.

We have seen the energizing effect that a successful technology planning effort can have. We can think of two cases in which the planning work served to motivate the participants to really engage with the processes of technology integration. Frankly, in both of these cases it has been a struggle to bring the actual technology plan documents to completion. But, in a larger sense, the accomplishments of planning have been realized even without a final document. There are other instances where planning documents were rushed to completion, but nothing happened subsequently. It may be simplistic, but it's also true: it's not the plan—it's the process.

Chapter

3

Integrating Technology into the Curriculum

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Integrating Technology into the Curriculum

What Do We Mean by Integration?

One thing that we have found to be consistent as we work in schools around the nation and in the SEIR•TEC region is that there are many different definitions of the term technology *integration*. So, to begin this chapter on the *integration* of technology, we offer our definition of the term. To us, integration is *the use of technology by students and teachers to enhance teaching and learning and to support existing curricular goals and objectives*.

In other words, we are not talking about computer classes or some other sort of stand-alone technology curriculum that focuses on teaching students about technology. By and large, we are thinking about regular classroom teachers using the different technologies to support the learning of all students within and across curriculum areas. We are always careful to remember that technology is not a cure-all, and sometimes the best teaching tool is not a technology tool. Technology benefits skilled teachers and engaged students but does not by itself *create* either. As with any teaching tool, technology must be understood within the broad context of curriculum and pedagogy.

At the same time, technology tools come with their own particular challenges and benefits. We work toward a vision in which all teachers use technology fluently and seamlessly to support student-focused learning rather than teacher-driven instruction. At present, however, teacher use is typically neither fluent nor seamless. Indeed, the attention paid to technology planning and use often serves to highlight other educational problems such as teachers with weak pedagogical skills and insufficient understanding of the curriculum; a lack of staff development and other support for teachers; and conflicts between educational expectations and the effort required to meet those expectations. The bottom line is that many teachers find it difficult to integrate technology because it usually means changing the way they teach. And, it doesn't help matters when policymakers measure the success of technology initiatives in terms of student scores on standardized tests.

Fortunately, there are a number of research studies that give evidence that effective teaching and learning with technology can improve student outcomes. For example, research conducted through the Apple Classrooms of Tomorrow (ACOT) indicates that students who use technology extensively as part of their daily school experience exhibit the following behaviors and characteristics:

- Explore and represent information dynamically and in many forms.
- Become socially aware and more confident.

- Communicate effectively about complex processes.
- Use technology routinely and appropriately.
- Become independent learners and self-starters.
- Know their areas of expertise and share that expertise spontaneously.
- Work well collaboratively.
- Develop a positive orientation to the future.

Our experience suggests that when teachers realize that technology can improve student learning, they are willing and eager to begin integrating it into the ongoing educational program. For more information about research on the impact of technology on learning, look on the Internet at the following sites:
http://www.apple-imac.com/education/k12/leadership/acot/
http://www.ed.gov/Technology/TechConf/1999/confsun.html
http://www.mcrel.org/products/tech/technology/impact.asp

Once teachers realize the potential for improving learning through the effective use of technology, and as they strive to become competent or even proficient technology users, they begin to change the way they teach. The ACOT studies revealed that teachers go through stages as they learn to infuse technology into teaching and learning (Sandholtz, Ringstaff, and Dwyer, 1997). As teachers move through the phases and learn to fluidly integrate technology into the curriculum, they usually find it hard to understand how they could have taught without it.

ACOT Stages of Technology Integration

Stage	Example of What Teachers Do
Entry	Learn the basics of using the new technology.
Adoption	Use new technology to support traditional instruction.
Adaptation	Integrate new technology into traditional classroom practice. Here they often focus on increased student productivity and engagement by using word processors, spreadsheets, and graphics tools.
Appropriation	Focus on cooperative, project-based, and interdisciplinary work—incorporating the technology as needed and as one of many tools.
Invention	Discover new uses for technology tools (for example, developing spreadsheet macros for teaching algebra or designing projects that combine multiple technologies).

As teachers integrate technology into teaching and learning, shifts occur in classrooms. In essence, traditional teacher-focused instruction changes to student-oriented knowledge construction, as the following chart from ACOT's research shows:

	Traditional Instruction	Extended (Knowledge Construction)
Activity	Teacher-centered and didactic	Learner-centered and interactive
Teacher role	Fact teller and expert	Collaborator and sometimes learner
Student role	Listener and learner	Collaborator and sometimes expert
Learning Emphasis	Facts and replication	Relationships and inquiry
Concept of knowledge	Accumulation	Transformation
Demonstration of success	Quantity	Quality
Assessment	Norm-referenced and multiple guess	Criterion-referenced and performance portfolios
Technology use	Seat work	Communication, collaboration, information access, and expression

Technology allows students to become active learners and to develop their problem solving, critical-thinking, and creativity skills. Technology offers students and teachers rapid and broad access to information and resources. Tools such as the Internet provide the means for students and teachers to engage in inquiry-based learning and to interact with a world of collaborators, information providers, and fellow learners. Computer-based simulations can engage students in open-ended explorations of *what if?* scenarios that would be impossible to recreate in the physical (as opposed to virtual) universe.

Common information-technology tools, such as spreadsheets and databases, allow the rapid and flexible manipulation of information, enabling students (and teachers) to analyze data and to form insights from a number of different perspectives and in sync with an individual's own particular patterns of mind. Also, the use of technology tools such as word processors and multimedia presentation managers help students improve communication skills and assume responsibility for the quality of their products of learning. True, all of this *could* be done without technology, but if the tools are there, and are undeniably used in the world outside of school, why *wouldn't* teachers and students want to use them?

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THE Tools — Tools in this Chapter

Information technology such as computers, software applications, video, audio/visual multimedia, and telecommunications can be integrated into virtually any classroom situation. The key is to start with your curriculum goals and then to match them with the appropriate technology tools. Another is to examine state or national standards for learning, both for technology and in the content areas, and then to identify ways teachers may use technology to help students meet the standards.

Thus, it is with technology's particular challenges as well as its benefits in mind that we provide the following tools for integrating technology within the curriculum.

Managing One or More Computers in the Classroom without Losing Your Hair or Your Sanity. Written by SEIR•TEC members Jeanne Guerrero and Donna Ashmus, *Managing One or More Computers in the Classroom without Losing Your Hair or Your Sanity* will give you some down-to-earth suggestions for how to think about technology in the classroom.

Technology Standards for Students. *Technology Standards for Students* provides information about national standards for technology proficiency.

Integrating Technology into the Curriculum. *Integrating Technology into the Curriculum* gives you a conceptual framework for understanding four basic types of instructional technology. We have also included in each type a description of the software applications used in many educational settings.

Software Applications Commonly Used in Interdisciplinary Curriculum Units. The material details, and provides some guidance in the use of, the different types of productivity applications—such as word processors, spreadsheets, databases, and presentation managers. In our experience, these applications are among those most commonly used by teachers.

Available Technology Inventory Worksheet. The worksheet is a tool you can use before starting to create a technology-infused lesson or curriculum unit. It often helps to take stock of what technology you have and how it is arranged.

Steps Toward Infusing Technology into an Existing Curriculum Unit/Activity. This guide includes some tips for taking your existing lessons or units and enriching them with the integration of a few technology tools and resources.

Classroom Activity Planning Template. This template is designed to assist you in identifying the key issues, outcomes, resources, and processes necessary to create a technology-infused classroom activity, regardless of whether you are starting from scratch or are diagramming and documenting an existing activity.

Classroom Observation Worksheet. If you have an opportunity to observe teachers' use of technology in the classroom, our *Classroom Observation*

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Worksheet can help you document what you see. We have used a similar tool when conducting research on teachers' technology use.

Technology Integration Progress Gauge. To get you started on assessing technology's impact across your entire school or district, we have included the *Technology Integration Progress Gauge* and some information on how this sort of tool—and similar tools—can be used to monitor technology integration.

Online Resources and Instructional Ideas. Rather than attempting to provide an exhaustive list of lesson plans and web sites, we have compiled the *Online Resources and Instructional Ideas* section with the goal of offering one or two ideas that illustrate what we mean by technology integration. We also list several sites (out of the hundreds in existence) that comprehensively catalog lesson plans and curriculum materials. These should form a good starting point for your search for online materials.

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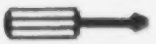
Putting the Tools to Work



Managing One or More Computers in the Classroom without Losing your Hair or Your Sanity

To begin the discussion about technology integration, you may enjoy some tips and strategies from an article reprinted from a SEIR•TEC newsletter. The article was written by SEIR•TEC staff members Donna Ashmus and Jeanne Guerrero.

Imagine Steven Spielberg walks into your classroom with a horde of cameramen, soundmen, and technicians. They set up all kinds of moviemaking equipment around your students. Then, Mr. Spielberg looks up and gives you the signal, "Lights, camera, action!"

Although not everyone gets to be in the movies, many teachers feel that they are on camera each time they walk into their classrooms. Teachers perform not only for students, but also for principals, administrators, and parents. It can be daunting, even for the most well-trained teacher.

The progression of technology in the classroom, however, is changing the role of the teacher from one of a performer who supplies all knowledge to the role of a facilitator who collaborates with students in learning and achieving. When appropriate techniques and teaching methods are combined with technology, difficult concepts can be understandable and even exciting to the otherwise unmotivated students.

Since its inception in 1995, SEIR•TEC has been working to promote educational change through the use of technology. In the Consortium's intensive site schools, SEIR•TEC staff have witnessed educators changing from instructors afraid to touch computers to proficient technology users. These teachers are developing bold and innovative lessons for their students and community members. While many of the experiences are unique to a particular setting, there are some insights and ideas that will help teachers struggling to keep their sanity and still find ways to help their students use technology.

Relevant Questions

Teachers have long recognized that textbooks do a good job of presenting information in logical formats, but not quite as good a job in making material relevant to the students in the real world. Technology has given instructors another way to apply school knowledge to authentic events. Teachers should consider these relevant questions when beginning to infuse technology into the curriculum.

How can I use technology in the classroom? Instructors can respond to this question by using the Internet, CD-ROM-based encyclopedias, and instructional CD-ROMs to create authentic tasks. For example, one teacher uses the Internet to research an author's bibliographical and contact information. The

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author responds and the class is able to ask timely and relevant questions about the book they are reading. Another teacher performs potentially dangerous chemistry experiments by using computer simulations.

How do I introduce my students to technology? Introducing students to technology is an important part of integrating technology into the curriculum. A language arts teacher uses a Microsoft PowerPoint presentation to introduce herself to the class at the beginning of the year. Using a large-screen monitor, she then creates another presentation in front of the class while directing student volunteers to actually create the slides. The students are then divided into groups and create their own presentations using the teacher's template.

How do I organize my classroom? Managing technology in the classroom is one of the greatest challenges for a teacher. A technique one teacher uses with a limited number of computers is to assign students into groups and assign each group a curriculum-related topic. The groups rotate through stations that offer a variety of books, magazines, the Internet, instructional CDs, and hands-on manipulatives. There are additional activities for groups that finish early. The teacher reviews the assigned and additional tasks at the beginning of class. A timer keeps track of how long students are at each station. When the timer rings, the group members save their work and rotate to another station.

Is technology beneficial to the learning objectives? Technology for technology's sake is not a wise strategy in the classroom. Educators need to make sure that the technology matches and enhances learning objectives. Technology can motivate students and provide a fresh and different perspective to different learning styles. As a teacher in the classroom, knowing the capability of your students is the best indicator of what can and cannot work well.

Hardware Issues

Instructors must make a variety of hardware-related decisions when managing classroom technology. For example, display and accessibility—with only one or two computers available to an entire classroom, how can all the students participate in a computerized activity during their allotted classroom time? A sixth-grade teacher in South Carolina addresses this problem by using a scan converter to project the monitor image to a large-screen TV and places the classroom's two computers on portable carts so they can be easily moved. Computers on portable carts can also be moved from one classroom to another, decreasing the computer/student ratio. When portability is an issue, so is security. What about security? Several schools secure portable carts in closets or chain the carts to an eyelet screw in the wall.

Software Issues

Many teachers and technology coordinators think that they need to purchase a plethora of specialized software packages. Although there is excellent content-specific software, most recently purchased computers are already

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loaded with word processors such as Microsoft Word or AppleWorks that can be used for writing reports, tests, and quizzes, letters to parents, and recording student grades. Other programs on the computer might include software such as PowerPoint or KidPix that can generate multimedia student presentations. Spreadsheet and graphing software can aid in keeping student grades and records. Additionally, reference works, e.g., Encarta and Grolier's, as well as the World Wide Web, are excellent sources for research. Before planning any lesson, however, a teacher should keep in mind the computer software available in the classroom.

The development of many activities related to technology can be severely restricted if students don't have access to necessary software packages. The instructor must be aware of the resources or limitations they have in accordance to the software that is available to them.

Curriculum-Based Lesson Plans

When considering what kind of technology, the instructor should focus on the educational goals of the lesson. Technology cannot aid a teacher if there are no instructional goals in mind. Additionally, technology is useless without appropriate planning. Each lesson plan should be based on the curriculum and include the following points:

- Overview—a brief description of the subject and lesson plan
- Objectives—a list of what learning objectives will be achieved
- Prerequisite skills—the skills a learner should have mastered in order to begin the assignment
- Learning activities—what the teacher and students will do in order to achieve the learning objectives and how technology is an integral part of the activities
- Assessment—the evidence or products designed to indicate the extent to which students met the learning objectives
- Time allotted—length of time a lesson will last, which can span from a classroom period, a week, a month, or an entire school year
- Resources—what technologies and other materials will be used
- How to begin—the way the teacher will introduce the lesson to the students

Other Tips and Tricks

Think about these suggestions when planning technology-infused instruction:

Use cooperative learning groups or teams. Working together, students have a greater opportunity to learn to use a computer when the student/computer ratio is high. Groups also help students learn to work together amicably.

Use mentors, volunteers, and/or parents. The more individuals you have in the class to answer questions and provide guidance, the easier the task for the teacher.

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Create "trained experts" in class. Students love to be the teacher. Designate one (or two) student(s) to be the class expert on word processing, presentation software, and any other commonly used software package. This student is then responsible for teaching other students how to use the software and for answering any questions a student may have. This frees the teacher from having to run to the computer every time a student has a technical question.

Preplan! Make sure that students use their time on the computer wisely. For some assignments, a teacher may want students to have a rough draft of their work before they go to the computer. This increases the students' productive time with the computer. There may be other situations in which students are allowed to compose their work at the computer.

Provide a template or sample of available graphics and fonts. Students can spend far too much time trying out graphics and fonts. While they need time to experiment with different looks and style options, some limits are needed to be sure they complete the work in a reasonable amount of time.

Create a project rubric. Students are more successful when they know what is expected of them. Direct the students in deciding what kind of presentation, what kinds of multimedia, and how many slides or stacks are required. When students are involved in creating their own assessment tool, they will be more likely to fulfill and surpass those requirements.

Break the project into small parts. Students can lose interest if a project lasts too long. Allowing them to work on parts of an assignment instead of the entire enterprise helps maintain enthusiasm.

Team with other teachers to create more meaningful lessons. Collaboration with other teachers can reinforce learning objectives as well as make lessons more interesting. A teacher in a science class might expand composition skills by having students write about a chemical experiment. A mathematics teacher might broaden art skills by having students draw figures that emphasize geographic relationships between shapes and objects. Teachers do not have to work in isolation. When they share their work and gain insights from others—students and teachers—learning is enhanced for everyone.

Conclusion

Throughout the work SEIR•TEC has done in the field with teachers in different classrooms and different settings, the common denominator is that the technology must be usable. No matter how cute, colorful, or nicely packaged a computer is, it will stay wrapped in bubble foam until the teacher can actually find a way to use it. Having only one computer should not be an obstacle to meaningful activities for students, although once teachers understand technology's potential, they quickly want more computers for their students. This article has provided ideas for using technology in the classroom. Remember, start small and simple. Integrate activities into existing units. Be creative. And most of all, have fun.

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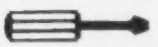


Technology Standards for Students

Many districts struggle with the issue of teacher and student technology competencies or standards. Overall, competencies or standards mean those things that teachers and students should *know about* technology and be able to *do with* technology. In many cases, a district may need or want to adopt standards that have been established at the state or national level. Some states, such as Florida, have standards for academic subjects and indicate specific technology uses that help students reach the standards. The standards from Florida can be found at http://www.firn.edu/doe/menu/sss.htm. Many are adapting or adopting the National Educational Technology Standards (NETS) developed by the International Society for Technology in Education, which can be viewed online at http://cnets.iste.org/.

Integration

Since we live in a time when standards, frameworks, and benchmarks are becoming increasingly prominent, it makes sense that some sort of competency or standard would be desirable for teacher and student technology use. The bottom line on adopting technology standards is that it must be done as part of the district technology-planning process. Teacher competencies are intimately related to the professional development goals and are in turn tied to the curriculum integration goals. Likewise, the student standards are parallel to the curriculum integration goals and are highly dependent upon the teacher professional development goals and, therefore, teacher competencies. Competencies, goals, and standards are linked in a cycle. And as we know, this cycle is driven by your district's *vision* for how technology will be used to support teachers, students, and the entire educational community. With this cycle in mind, it is clear that you cannot adopt or develop competencies and standards without the context of the other elements.

As a committee of stakeholders develops your plan, they need to review and consider competencies for teachers and standards for students. If your standards are ever going to be met by your teachers and students, then they must be rooted in *your* reality. We suggest the following process steps for developing teacher competencies and student technology standards:

- Engage your committee of stakeholders in a discussion about the need for competencies and standards and how these relate to other elements of the technology plan.
- Be sure that your committee has a common definition of key concepts such as technology integration. This ensures that your entire committee can have a common goal. Review your plan's vision statement to refresh your committee's understanding of the big picture for technology in your district.
- Begin work on the curriculum integration portion of your plan. This helps ensure that the curriculum will drive your process of determining what students should be able to do with technology (the student standards) and what teachers need to know in order to support student use (the teacher competencies).
- Review your state's requirements regarding student standards and teacher competencies, the professional literature on standards and competencies,

and examples of other districts' work in this area. Note that we suggest taking this step later in the process rather than at the beginning. This helps avert the natural desire simply to appropriate existing work without first grounding it in your school's reality.

- As you adopt or develop competencies and standards, ask yourself if what you are developing is (1) *do-able* by teachers and students with the existing or projected resources; (2) *flexible* enough to account for changing technology; and (3) *exemplary* rather than mandatory. That is, do you provide examples of what you expect to observe, or do you just give orders with little guidance?

Establishing student standards is a bit more complex than establishing teacher standards. Part of this complexity comes from the issues surrounding any standards for student learning. Unfortunately, much of the discussion we hear in the districts struggling with this issue relates to defining what sorts of *mechanical* skills students are expected to have in order to operate various devices. What is often lost in this discussion is any reflection about *why* students might use computers, software, the Internet, and so on. Once again, educators need to think about the more important issue of helping students learn which tools are best used for a particular learning task.

The best student-technology standards—and we believe that the term *standard* is more appropriate here than *competency*—focus on ensuring that students be exposed to a wide range of situations in which technology is used as a part of an active, engaged learning experience. Naturally, this can be achieved only when technology use is thoroughly integrated throughout the curriculum rather than allowed to stand as a single curriculum subject. Students are not in school to learn technology, particularly at the elementary- and middle-school levels. Just as with teachers, total mastery of a particular software package or hardware device is only really instructive as a pathway to understanding the broader place of information technology as a tool for exploration and learning.

When viewed this way, student technology standards are very closely related to the *curriculum integration* goals of the district's strategic educational technology plan. If students are in school to master the curriculum, then the goals for their use of technology should be to help them do the same.

One thing to be very wary of is the urge to teach the standard, a practice that some districts fall into after they adopt student-technology standards. This seems to happen most often when standards are construed to be very specific skills or technology-related facts that students are expected to master by particular grade levels. Often, districts with these types of student standards feel that they have to involve their students in specific technology classes where particular applications and operation skills (e.g., keyboarding) are taught. While this *may* lead to mastery of the skills specified in the standards, it also has the effect of pulling technology use entirely out of the regular classroom and its learning activities. For many students, this diminishes technology to the level of any other class and

thereby negates many or most of its educational advantages related to inspiration, creativity, and engagement.

There are several ways to avoid isolating technology as a subject matter in itself. The first consideration is to create student technology standards that relate entirely to using technology within the curriculum. Therefore, your standards will connect technology use to actual curriculum-related projects or activities. Rather than the simple requirement "Use the World Wide Web," an appropriately focused standard would be to require that students use the World Wide Web as part of a research project that is part of an integrated language arts and social studies unit. Use your district's curriculum and its objectives for creating student technology standards.

A major weakness in the writing of student standards is the fact that few technology planners are sufficiently familiar with their district's curriculum goals and objectives. As a result, technology specialists write the technology plan and tie student standards to what they themselves know best—technology. We cannot overemphasize the importance of this issue. Student technology competencies cannot and should not be separated from curriculum goals and objectives. They are also woven into teachers' professional development, and specifically into professional development that helps teachers understand the role of technology within their classrooms and curriculum.

With all of this in mind, we offer the following guidelines for adopting student technology standards for your district. Teacher-technology standards and competencies are addressed in the next chapter, which focuses on professional development.

- Make sure that the same people who are writing your plan's curriculum integration goals are also working on student standards. Student standards are about how students will use technology within the curriculum. This should be consistent with integration goals.
- Avoid the urge to focus narrowly on using specific technology tools. Instead, think categorically about technology use. For example, it is better to talk about the fact that students will need to learn how to use word processors within the writing process than it is to talk about mastering a specific word processing program on a specific machine in a specific class. Keep in mind that your plan should last a number of years. If you upgrade your software or hardware, will this negate your standard?
- Think about *who* will be responsible for ensuring that students meet the standards. If the answer to this is the classroom teacher—as we advise—then make sure that you have given adequate thought and resources to how teachers will be prepared to assist all of their students in meeting the standard.
- Ask yourself, "Is the standard reasonable and achievable?" Is it reasonable to expect that classroom teachers with no technology training can provide students with opportunities to use technology tools in their learning activities? Is it reasonable to expect that a single *computer teacher* in the school will be able to *train* every student in a particular software application described in a particular student standard?

- Create student standards that evolve and escalate over time. This strategy allows you to correlate student standards to professional development for teachers and the growing technology infrastructure.

Examples of Student Competencies

- The National Educational Technology Standards (NETS) for Students project is a collaborative national effort to set student technology standards. Several nationally known nonprofits and technology manufacturers sponsor this work. The NETS standards can be viewed online at http://cnets.iste.org/.
- A related approach to developing student standards involves assessing student technology skills and assigning various levels to the skill groupings. This is the approach taken by the Bellingham (Washington) school district. The various assessments Bellingham uses form the basis for determining what skills training a given student requires. View the Bellingham assessment instruments online at http://www.bham.wednet.edu/assess2.htm.

Integrating Technology into the Curriculum

Finding the Right Tool for the Task—Four Categories of Technology Use

Information technology such as computers, software applications, video, audio/visual multimedia, and telecommunications can be integrated into virtually any classroom situation. The key is to focus on **what** you are trying to accomplish within your curriculum (i.e., your learning goals and objectives), and then to identify an **appropriate technology tool** that will help you accomplish your goal. This is not as simple as it sounds.

We believe that one path towards simplification lies in the identification of different categories of technology that can be broadly said to support different classroom strategies. Educational researchers, and in particular Barbara Means (1994) in her landmark work on technology's role in school reform, have identified four categories of software applications. While by no means exclusive, this categorical identification helps illustrate the point that not every strategy can be supported by any or every technology. More specifically, you need a variety of tools to accomplish the variety of objectives associated with a given curriculum. No single piece of software or hardware can be expected to address all of your classroom needs. Sorting educational technology by *category of use* is a step towards learning how to apply the right technology tool towards a given task. We don't maintain that this is the *only* way to separate the types, but it is comprehensive and one which we have found to work with many teachers.

Finally, please note that the software examples cited here are just that, examples. In fact there are many titles which would be equally valid examples for most of these categories, and our citations below do not imply recommendations or endorsements.

Tutorial Uses of Technology

Tutorial technologies are those that support the transmission of information from source to student. The technology itself might be a software application that presents questions, allows time for answer, and offers corrections or rewards for the right or wrong response. Often, tutorial technologies present their lessons accompanied by a variety of multimedia. Tutorial technologies are useful for the development and reinforcement of basic skills. Thus, it is not surprising that tutorial technologies are often found in lower grades (and in remedial programs at higher grades) and are used to support skills such as spelling, grammar, vocabulary development, and basic-function mathematics.

Examples

- Drill and practice games such as the MathBlaster series, Grammar Games, and SpellIt
- Integrated Learning Systems (in their most common use, one student per computer)
- Computer-based training and testing

Application Uses of Technology

Application technologies include such tools as word processors, spreadsheet programs, databases, and other data collection/manipulation/analysis programs. The operative term is *tool*, since applications such as those above have no content in and of themselves. For example, a word processor may be used at all grade levels and in every subject. The application use of technology is an interim, or process, step towards achieving an instructional goal.

Examples

- Integrated packages such as AppleWorks and Microsoft Office and their word processors
- Excel and other spreadsheet programs
- TimeLiner (as an information organization and presentation tool)
- HyperStudio, KidPix Studio Deluxe, PowerPoint, and other multimedia packages
- Multimedia encyclopedias such as Microsoft Encarta and Grolier's
- World Wide Web and student research

Exploratory Uses of Technology

Exploratory technology combines some content with a particular delivery strategy to encourage students to explore a subject and construct their own knowledge. The majority of exploratory technology applications are open-ended and can produce a variety of narrative outcomes. The primary goal when using an exploratory technology is not to get the right answer but rather to use the technology to engage with a subject and derive meaning from that engagement.

Exploratory technologies are often used to facilitate student cooperation, critical thinking, and group problem-solving.

Examples

- Simulations such as SimCity and Sim Earth
- Life and physical science simulations
- Simulated journeys, such as Oregon Trail
- Role-playing, group problem solving packages, such as The Great Ocean Rescue, Decisions Decisions, and Rainforest Researchers
- Multimedia encyclopedias, such as Encarta and Grolier's
- World Wide Web searching and student research

Communication Uses of Technology

Communications technology describes those uses of telecommunications that support teaching and learning. Communications technology can be used in any of the three modes/categories discussed above (tutorial, application, and exploratory). Often, communications technology is used in an exploratory mode to facilitate student collaboration and research across great distance. As with the application category, communications technology is a tool which in itself is content-neutral. On the other hand, the use of this tool can enable the teaching of certain content and the fulfillment of certain learning goals that would otherwise be more difficult if not impossible.

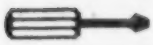
Examples

- E-mail (student-to-student, student-to-professional, etc.)
- Collaborative, online projects, such as The Journey North or those found at EnviroNet
- Teleconferencing (CUSeeMe, satellite, compressed video, etc.)
- World Wide Web searching and student research
- Student publishing on the World Wide Web

A list of software publishers that includes the resources mentioned above is provided in Chapter 6. For more information on these four categories and technology's role in school reform, see Barbara Means's seminal works:

Jossey-Bass Education Series. 1994. *Technology and education reform: The Reality Behind the Promise*. San Francisco: Jossey-Bass.

Means, Barbara; Olson, Kerry. 1994. The Link Between Technology and Authentic Learning. *Educational Leadership* 51 (April): 15–19.



Software Applications Commonly Used in Curriculum Units

Applications technology describes software programs that in themselves have no subject-matter content. These programs are tools in the classic sense. Therefore, not surprisingly, the software application tools used in education are the same tools used in other settings such as business. Spreadsheets, database programs, word processors, and presentation authoring tools are commonly used by all personal computer users and are readily available for many teachers and students.

Applications tools are often bundled together by a manufacturer or distributor and arrive as part of a new computer purchase. These bundles are often referred to as *integrated software* or *application suites* and are sold under brand names such as Microsoft Office, Microsoft Works, or AppleWorks. The programs that comprise the bundle are determined by the manufacturer. Nevertheless, the basic idea behind bundled applications is the same. Central to the concept of integrated-software bundles is the idea of a menu interface that is common among the elements of a bundle (i.e., the word processor, spreadsheet, and other programs have the same menus and icons). This simplifies learning the different commands that work across the programs, and it allows the user to move data easily among different application tools.

Please note that the following software applications are just examples. In fact there are a number of titles that would be equally valid examples for most of these categories, and our citations below do not imply recommendations or endorsements.

Spreadsheets

Examples: Microsoft Excel, AppleWorks

A spreadsheet is a program that organizes cells of numerical data into tables of rows and columns much as one would find in an accounting ledger. Through the use of equations (written in a simple programming language unique to the particular spreadsheet program in use), the spreadsheet program is able to perform basic mathematical functions across the rows and columns. For example, it is possible to total a column of numbers, divide that total by cells within the column, and report the resulting average elsewhere on the spreadsheet. Most spreadsheet programs provide a capacity for graphing data. Graphs can range from simple X-Y line graphs to more complex three-dimensional representations.

Spreadsheets are excellent tools for collecting and analyzing data and thus work well in curriculum units that call for students to address both interdisciplinary content and process/information analysis tasks. Students can design spreadsheet layouts, collect the data to fill in the various rows and columns, and then write equations to analyze the data they have collected. In this way, a spreadsheet becomes a vehicle for learning about and representing both simple and complex relationships between numbers and pieces of information.

While the use of spreadsheets is common in mathematics and science curricula, they can be used whenever data collection and analysis are required.

Many teachers use spreadsheets in social studies curricula where students might collect numerical information and organize it chronologically. Projects on genealogy and immigration make particularly good use of spreadsheets.

Database Management Programs

Examples: Microsoft Access, FileMaker Pro

A database-management program is used to create, organize, and manipulate information in databases. Databases work much like spreadsheets, although they are often used where textual information is more important than numerical data. Databases are primarily used for creating records of collected information. Most database-management programs allow for some degree of numerical analysis of the collected information (e.g., counting, grouping, sorting by rank order, etc.).

Databases are often used in interdisciplinary curriculum units. They become a vehicle for information collection and organization. The manipulation of information within a database calls for mathematics and critical-thinking skills. These skills are further enhanced when a student designs a database using a database-management program.

Word Processing Programs

Examples: Microsoft Word, AppleWorks

Most teachers are familiar with word processing programs as tools for producing lesson plans, student/parent communications, and personal correspondence. Students make use of word processors in similar ways. Certainly, research papers, projects, and other written communications can be accomplished with the use of a word processor.

Aside from simply making student work appear neater, word processors have pedagogical importance in that they have been found to encourage students to write more, with greater ease in editing and revising their work. Thus, word processors are powerful tools in developing writing, critical-thinking, and research skills. Furthermore, the word processor as a technology-based tool encourages and motivates certain students who have difficulty with the manual task of handwriting. Finally, many students take greater pride in work that has been produced with a word processor, and this motivates them to continue writing and performing the other learning tasks associated with their writing.

Word processors are not just used within language arts curricula. Students often use these tools to produce work related to any subject area, and this work often becomes the source document for importing data into databases, spreadsheets, and presentation programs. In this way, the word processor is often the cornerstone application within integrated application suites such as Microsoft Office, Microsoft Works, or AppleWorks.

Presentation Tools

Examples: Microsoft PowerPoint, Hyperstudio

Presentation tools allow students and teachers to take text, numerical data, graphs, sounds, and visual images and organize this information into multimedia presentations. While it is possible to use multiple media (e.g., sounds and images) within a presentation, it is also possible to create a text-only presentation. It is important to remember that although most presentation tools support the creation of very sophisticated products, the degree of sophistication and complexity is very much under the control of the author.

Almost any student project can result in a presentation. Presentations can be made before an entire class or be designed for individual viewing. Multimedia presentation tools can be integrated into any lesson or unit that would otherwise result in a paper-and-paste-project product.

While a presentation tool such as PowerPoint is simply software, this software usually requires the use of particular hardware to acquire digital images/sound, including digital cameras or scanners, and to display the resulting multimedia presentations. Quite often, the material that makes its way into presentations is imported from other software applications such as word processors and spreadsheets that create tables and graphs.

Additional Information

Previously in this section, we presented software tools teachers can use to support learning in different content areas. The next question that many teachers would have relates to finding specific curriculum-unit ideas for teaching and learning in the one-computer classroom. In fact, this is where the *real* fun lies. Fortunately for those who want to see what other teachers have done, many informational resources are available that provide lesson and unit ideas. Following are just a few to get you started:

Great teaching in the one computer classroom, David Dockterman. Tom Snyder Productions, 800-342-0236, http://www.teach.tsp

Productivity in the classroom, Microsoft and Scholastic, http://www.microsoft.com/education.

More classroom tips can be found at http://www.microsoft.com/education/lesson/productivity/acknow.asp.

Available Technology Inventory Worksheet

Do you have technology resources such as those listed here to use in curriculum-based projects? When considering the way in which technology can enrich your curriculum, it is first necessary to inventory your available technology so that you will know what is possible in terms of access for you and your students. In other words, "available" refers to a particular device or software program that

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Available Technology Inventory Worksheet (page 1 of 3)

Remember that you might have access to technology that is not physically located in your classroom. Check with your librarian, school technology coordinator, and/or other teachers to find out if resources exist that you might borrow or share with other teachers.

Computers

- Computers for teacher use (where and how many?)
  Classroom computers-one per class
  Four Computers in LMC. Computer in staff workroom
- Computers for student use (portables, AlphaSmarts, lab computers, classroom computers, etc.; where and how many?)
  Classroom computers-one in each classroom
  Macintosh Lab-20 computers

Presentation and output devices

- Projection devices (e.g., scan converter, LCD, video projector)
  Scan converter-TV-new-to use with large screen TV on cart
  Video projector can be checked out from district office-Media Dept
- Printers
  Inkjet printer in classroom. Laser printer on LAN in Mac lab

Input Devices

- Scanners
  Scanner in LMC
- Digital cameras
  No
- Digital video cameras
  No (What is a digital video camera??!!)

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is actually accessible to you. This is differentiated from existing technology to which you have no ready access. A reproducible version of the worksheet is found in the Appendix.

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SEIR•TEC Appendix

Available Technology Inventory Worksheet (page 2 of 3)

Internet

- Teacher access

  Internet available in Mac Lab and on machine in LMC. First-come, first-served access.

- Student access (Existence of Internet acceptable use policy)

  District tech. coord. says that the Board will vote on this next meeting! Until then, be careful about controlling student access.

Software and applications (Note: identify what is available for teacher, students, or both)

Applications technology

- Basic productivity (word processor, spreadsheet, database)

  ClarisWorks on every machine. MS Office on the machines in the LMC and teacher workroom. ClarisWorks on every machine. MS Office on the machines in the LMC and teacher workroom.

- Presentation manager (e.g., PowerPoint)

  ClarisWorks Slide Show???

- Multimedia production (e.g., HyperStudio)

  No

- Reference materials (e.g., multimedia encyclopedia such as Encarta)

  World Book, Encarta, Grolier's CD-ROMs, "The Animals" CD-ROM

Subject area–specific technology (Note that many applications are multidisciplinary.)

- Math software applications

  Math Blaster, Number Munchers

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Appendix

Available Technology Inventory Worksheet (page 3 of 3)

- Science software applications

- Language arts software applications

- Social studies software applications
  Carmen San Diego

- Visual Arts (e.g., drawing) software applications
  KidPix Studio, clipart CD-ROMs, Banner Maker Deluxe

- Music software applications

Communications technology

- World Wide Web/Internet
  Can get to WWW on two machines. Netscape is loaded on all machines but only works on the Internet connected ones.

- E-mail
  Teachers have personal accounts. District tech. coord. says not to allow students to have access e-mail (??)

- Internet-based videoconferencing
  Huh? What is this?

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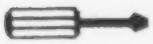

Steps Toward Infusing Technology into an Existing Curriculum Unit/Activity

Many teachers find it useful to explore the process of technology integration by modifying an existing curriculum unit to make use of technology tools. In this way, the teacher is not so much creating new curriculum activities as using technology to improve the delivery of the current curriculum.

1. **Examine the unit/activity. Think about how technology can be added to this unit to support and improve student learning.**

   - Combine technology with traditional resources: Use electronic resources along with traditional print-based materials.

     Example: Use CD-ROM encyclopedias, atlases, or web sites for research.

   - Substitute or add a technology element to an existing project.

     Example: Instead of creating graphs using pen and pencil, use a graphing program to display information.

   - Adjust or expand a project to reach higher student expectations.

     Example: Have students use multimedia presentations to get across ideas and increase enthusiasm.

   - Use the appropriate tool at the appropriate time.

     Example: Use e-mail when introducing the concept of friendly letters. Introduce presentation software when needed for public speaking.

   - Critically evaluate the quality and quantity of your instructional materials. Recognize essential activities that support critical learning objectives and eliminate the nonessential.

     Example: Eliminate an assignment on a topic already presented.

   - Recognize that technology use takes time. Rearrange and prioritize unit activities and assign a time frame that reflect changes in the time it takes to perform certain activities.

     Example: Shorten, eliminate, or rearrange tasks.

2. **Rewrite the lesson unit. If necessary, revise your goals to reflect changes due to technology infusion.**

   - A lesson planning template, such as the one that follows, helps you focus on what changes are brought to your activity through the infusion of technology.

     Example: What technology tools and resources will you use in the unit?

   - In what ways does technology add value to the curriculum activity? Think about why the use of technology improves student learning in this redesigned unit.

     Example: Use of a technology tool (e.g., a spreadsheet program) allows students to manipulate data and produce graphs more easily.

3. **Prepare your unit/activity materials. Develop instructional materials, handouts, and assessments. Create a schedule that allows students maximum use of technology.**

   - You will need instructional materials that take into account the new tools used by students.

     Example: Create step-by-step instructions for using technology with which students may not already be familiar.

   - Create new assessment materials, such as rubrics, that assess both content learning *and* technology skills.

     Example: When students create an electronic presentation (e.g., Hyperstudio stack) for a research project, the assessment should be on the quality of their research and the quality of their presentation.

Classroom Activity Planning Template

Teachers can use this format to develop technology-enhanced lessons. A reproductible version of the worksheet is found in the Appendix.

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SEIROTH Appendix

Classroom Activity Planning Template (page 1 of 3)

Description of the proposed classroom activity

Grade 7, Earth Science
Rock identification-classifying rocks as either igneous, sedimentary or metamorphic based on physical characteristics and then entering that information into a ClarisWorks database.

Student learning objectives

What is the purpose of this activity? What sorts of student dispositions and/or attitudes will this activity support? How does this activity impact student interactions with others?

This activity will help students organize data that they are collecting. Students will observe rock samples and enter the data into the database. By sorting according to various characteristics they can see that different types of rocks have certain common characteristics. They will be able to draw their own conclusions about how a rock's classification is determined. Students will work in cooperative groups when observing the rock samples and entering the data.

Specific curriculum objectives

How does this activity support particular curriculum objectives, framework elements, and so forth?

State and District Science Benchmark ES7.5-Identify the differences between sedimentary, metamorphic, and igneous rocks, and describe the formation of each.

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Appendix SEIR•TEC

Classroom Activity Planning Template (page 2 of 3)

Assessment

How do you plan to assess student achievement of learning objectives? Rubrics, indicators, and so forth?)

As the students enter their observations into the database, I will be able to assess their observation skills (are they seeing what they say they are seeing?)

Technology to be used in this activity

State *why* this particular technology will be used.

ClarisWorks database. Maybe a digital camera or scanner to insert pictures of their rocks into the database.

Nontechnology resources or materials to be used in this activity

e.g., books, original sources, manipulatives, etc.

Students will need background information about the 3 different types of rocks. This can be through their text book, or through discussion, or through a slide show. Rock samples will also be required for them to classify.

Time necessary to complete this activity

Class days required, start to finish

This actual activity will take 3 class periods, although it comes at the culmination of a month long geology/earth science unit where students learn the principles they demonstrate knowledge of in this activity.

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Classroom Activity Planning Template (page 3 of 3)

Activity timeline/procedure

As specifically as possible, please describe this activity on a day-by-day, step-by-step basis. Be sure to include student directions, expectations, and teacher instructions. Please use additional sheets as necessary.

1. Start with an activity that has the students identify various physical characteristics of rocks. Give groups of students several rock samples and ask them to make observations and define some ways to tell them apart. This will lead to a discussion of characteristics and properties. We will generate a list of characteristics that are useful (e.g., size is not a useful characteristic because two pieces of the same rock can be different sizes).
2. The students will take that list of characteristics and use it to make observations and then enter their data into the database.
3. Students can then sort their data by various characteristics. They will be asked to look for patterns—is there a relationship between certain characteristics and the type of rock that it is? Can you determine the type of rock by looking at the characteristics? Can you say something about the characteristics if you know the type of rock?
4. Students will be asked to write a conclusion based on what they did.

Ideas for extended activities

How might this particular activity be extended to cover other curriculum units? If time were available, how might you expand this activity?

Classifying is an important science skill and is included in many of the curriculum frameworks (classifying living things into kingdoms, phyla, and classes, etc.) This type of activity could be adapted for use in many other areas.

Assessment/evaluation

What are your criteria for success? How will you know that this unit has had the student impacts related to the identified learning objectives?

As the students enter their observations into the database, I will be able to assess their observation skills (are they seeing what they say they are seeing?). By assessing their conclusions I can determine whether or not they know the characteristics of each rock type, and whether they understand the differences between them.

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Classroom Observation Worksheet

As a technology planner you will want to know what kind of technology teachers are using and how they are using it in their classrooms. If teachers in your school or district do not yet use technology, we recommend that you locate a school that does and plan a visit to that school. Take time to observe teachers and students interacting with the technology during an actual classroom session. Follow up that observation with an interview with the teacher you observed. Also, interview other educational professionals in various schools to gather their thoughts and recommendations regarding technology use in the classroom. A reproducible version of the worksheet is included in the Appendix.

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Appendix

Classroom Observation Worksheet

School _____ Teacher _____

Grade Level _____ Subject _____

Describe the types of computer applications the students are using in the classroom (tutorials, applications, exploration, or communication).

Technology was combined with traditional resources, the students were using electronic resources along with traditional print based materials.
CD-ROM encyclopedias, atlases, and the WWW for research.
They were also using email to communicate with pen pals.

What is the instructional purpose of the activity?

Using electronic presentations to present ideas and information and to practice speaking skills.
Using e-mail to reinforce letter writing and perhaps some social studies objectives as well.

Describe how technology is contributing to learning.

Students were able to express their ideas with email and that looked professional.
Other students were writing to children in other parts of the world. I need to remember to ask some of them what they are learning about other countries. I've never seen such long letters from children that young.

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Technology Integration Progress Gauge

SEIR•TEC developed another useful tool for planners to determine a school's or district's current status in five areas or domains impacting technology integration. The five domains are (1) Student Engagement, (2) Teacher Engagement,

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Technology Integration Progress Gauge (page 1 of 12)

State _____

School System _____

School _____

Completed By
(Circle all that apply)

a. District Staff School Staff
b. Administrator(s) Coordinator(s)
Teacher(s) Media Staff
Other: _____
c. Entire Faculty Tech Team
School Improvement Team
Other: _____

School Contact
Person: _____
Phone: _____
E-mail: _____

Reporting For (circle)
Fall 1999 Spring 2000

SEIR•TEC Coordinator
_____

Completion Date
_____

SEIR•TEC

Technology Integration Progress Gauge

Intensive Site Project—Site Profile

The intent of this instrument is to provide a simple tool to help school leaders (a) reflect on activities to date vis-à-vis effective practices in technology integration, (b) think about what needs to be done in order to impact teaching and learning through the use of technology resources, and (c) consider strategies for maximizing the impact of technology. The instrument is not to be used as an evaluation tool or an instrument to determine a grade. SEIR•TEC will not attempt to collapse individual intensive site profiles into a single figure, such as an average or grade. Similarly, there will be no attempt to rank intensive site schools according to the profile data. Instead this instrument is to be used as a tool to develop a school profile of technology integration and impact at periodic times during the intensive site project.

The instrument consists of the five domains presented in a table format. The domains (labeled I, II, etc.) are described by two or more indicators. Each indicator has four levels of implementation. The four levels are:

- **Minimal:** Little or no evidence of implementation.
- **Beginning:** Implementation is occurring and evidence exists of capacity-building strategies in place.
- **Intermediate:** Plans exist and activities have begun for scaling up to a higher or sustainable level.
- **Advanced:** Strategies and activities are institutionalized and evidence exists that changes made will be sustained.

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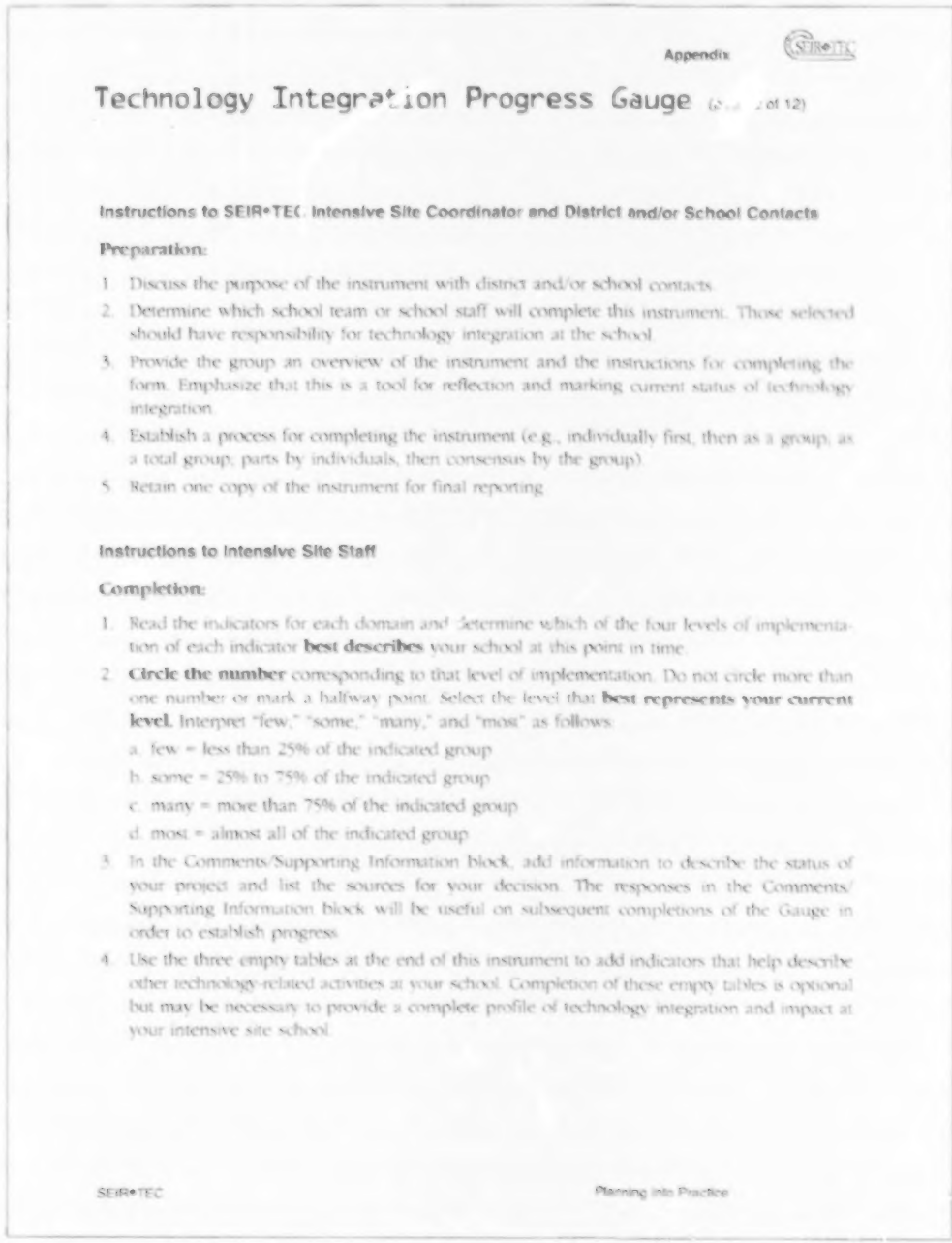
(3) Availability and Accessibility of Appropriate Resources, (4) Organizational Support, and (5) Community Involvement. A reproducible copy of the Technology Integration Progress Gauge is included in the Appendix. The one that follows is an example of how the tool might be completed for one district.



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Technology Integration Progress Gauge (Page 2 of 12)

Instructions to SEIR•TEC Intensive Site Coordinator and District and/or School Contacts

Preparation:

1. Discuss the purpose of the instrument with district and/or school contacts.
2. Determine which school team or school staff will complete this instrument. Those selected should have responsibility for technology integration at the school.
3. Provide the group an overview of the instrument and the instructions for completing the form. Emphasize that this is a tool for reflection and marking current status of technology integration.
4. Establish a process for completing the instrument (e.g., individually first, then as a group; as a total group; parts by individuals, then consensus by the group).
5. Retain one copy of the instrument for final reporting.

Instructions to Intensive Site Staff

Completion:

1. Read the indicators for each domain and determine which of the four levels of implementation of each indicator **best describes** your school at this point in time.
2. **Circle the number** corresponding to that level of implementation. Do not circle more than one number or mark a halfway point. Select the level that **best represents your current level.** Interpret "few," "some," "many," and "most" as follows:
   a. few = less than 25% of the indicated group
   b. some = 25% to 75% of the indicated group
   c. many = more than 75% of the indicated group
   d. most = almost all of the indicated group
3. In the Comments/Supporting Information block, add information to describe the status of your project and list the sources for your decision. The responses in the Comments/Supporting Information block will be useful on subsequent completions of the Gauge in order to establish progress.
4. Use the three empty tables at the end of this instrument to add indicators that help describe other technology-related activities at your school. Completion of these empty tables is optional but may be necessary to provide a complete profile of technology integration and impact at your intensive site school.

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integration

Technology Integration Progress Gauge (page 3 of 12)

Instructions to Intensive Site Staff and SEIR•TEC Coordinator

Reporting:

1. Prepare a final copy based on the decisions by the group.
2. Verify the contact and completion information at the top of page 1.
3. Make copies and distribute as follows:
   a. Original to SEIR•TEC Director
   b. Copy to intensive site school contact and/or district contact
   c. Copy for SEIR•TEC Intensive Site Partner
   d. Copy for SEIR•TEC Intensive Site Coordinator

Glossary

Community—Group including school members as well as public and private individuals, businesses, and /or agencies in the area served by the school.

Higher-level learning—Student activities involving one or more of the following: peer collaboration, integration of higher-order thinking skills, self-directed tasks, multidisciplinary assignments, authentic learning opportunities (based on real-world events or tasks)

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Appendix

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Technology Integration Progress Gauge (page 4 of 12)

Domains and Indicators

1 Level of Student Engagement

There is evidence that:

A. Students are involved in higher-order thinking skills activities supported by technology.

1	2	3	4
Few, if any, students are involved in learning activities requiring peer collaboration and interaction, technology applications, or higher-order thinking skills.	Some students are participating in technology-based learning activities requiring peer collaboration and interaction as well as higher-order thinking skills. A few students are sharing their technology skills in collaborative groups.	Many students are involved in authentic, technology-based learning activities requiring peer collaboration and interaction as well as higher-order thinking skills to solve real problems.	Most students are involved in self-directed, authentic, technology-based learning activities that are multidisciplinary and require peer collaboration and interaction as well as higher-order thinking skills to solve real problems. New products and understandings are evolving.
Comments/Supporting Information:			

B. Students are meeting the school's expectations for levels of technology use.

1	2	3	4
A few students are achieving levels of appropriate, initial technology use in learning activities, as defined by the school or school/district technology plan for their grade and the stage of implementation of the plan. Some students are exploring more advanced uses of technology.	Some students are engaged in activities to build the technology use skills expected for their grade and the stage of implementation of the school/district plan. Many students are achieving the expected levels and some students are developing skills in more advanced uses of technology.	Many students are applying the technology use skills and have documented mastery of the school expectations for their grade and the stage of implementation of the school/district plan. Many students are exploring more advanced uses of technology and some are demonstrating mastery.	Most students have met the school's expectations for technology use for their grade and for the stage of implementation of the school/district plan. Most are using regularly the skills mastered and are continuing to develop skills in more advanced uses of technology.
Comments/Supporting Information:			

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2 Environment for Teacher Engagement

There is evidence that:

A. Teachers design and implement technology-based learning experiences that promote higher-level learning for students and authentic assessment.

1	2	3	4
Few or no teachers design and implement student activities that require peer collaboration or integration or use of higher-order thinking skills. They are using technology mainly for demonstrations with minimum adaptations and little integration into their ongoing program. Most teachers plan and teach in isolation.	Some teachers design and implement student learning activities requiring peer collaboration and interaction as well as use of higher-order thinking skills. Groups of teachers are collaborating on use of specific technologies and resources and some are implementing the ideas individually or as a team. Some teachers are using technology for assessment.	Many teachers design and implement authentic learning activities requiring peer collaboration and interaction as well as use of higher-order thinking skills to solve real problems. Many teachers are planning and teaching collaboratively, using specific technologies and resources. Some teachers are designing authentic assessment tools using technology resources.	Most teachers design and implement technology-based, self-directed, multidisciplinary, authentic learning opportunities requiring peer collaboration and interaction as well as use of higher-order thinking skills. Many use technology resources to plan and teach collaboratively and to design authentic assessment tools.
Comments/Supporting Information:			

B. Teachers demonstrate the expected level of technology use. (Levels from ACOT Study.)

- Entry: Teachers are inexperienced and, possibly, inefficient in the use of technology. Many have misgivings regarding technology innovation, and frustration is common.
- Adoption: Teachers begin to incorporate technology into existing teaching practice, primarily to teach about technology and as a means of delivering traditional instruction.
- Adaptation: Teachers are integrating technology into the traditional teaching day. Classroom practices are still primarily traditional, but use of the computer as a tool is pervasive. Productivity and increased performance on traditional measurements are used as indicators of success.
- Appropriation: Teachers use technology in everything they do, to the point that the use of the technology in the lives of teachers and students is almost transparent.

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Technology Integration Progress Gauge (page 6 of 12)

Invention: Teachers are experimenting with new roles and new instructional strategies. The entire classroom is transformed and students are more engaged in learning and more self-directed.

1	2	3	4
Almost all of the teachers are engaged in activities typical of the entry stage. A few, if any, are beginning to model actions typical of the adoption stage.	A majority of the teachers has reached the adoption stage. Some teachers are beginning to discuss how to adapt the technology to teaching and learning with a few beginning to try customized versions of existing resources.	A majority of the teachers is engaged in the activities typical of the adaptation stage. Some of the teachers are beginning to combine technology resources and instructional strategies using technology in all learning activities.	A majority of the teachers is engaged in activities typical of the appropriation stage. A few teachers have begun exploring areas associated with the invention stage.
Comments/Supporting Information:			

C. Teachers integrate technology into all subject areas, using resources that map technology to curriculum.

1	2	3	4
Few teachers are aware of technology resources that support specific topics or lessons. There is no correlation or mapping of the existing resources to the curriculum. Few or no teachers are integrating technology into subject areas.	Teachers have access to a school inventory of available technology tools and resources. Mapping the technology resources to the curriculum has begun. Some teachers are piloting technology integration strategies and lessons.	Mapping the technology resources to the curriculum has been completed. Many teachers have been introduced to the guides that map technology to all subject areas. Some teachers have begun using them in their day-to-day instruction. Many teachers have begun limited technology integration lessons.	Most teachers are integrating technology into all subject areas, using the guides that map existing technology resources to the curriculum.
Comments/Supporting Information:			

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Technology Integration Progress Gauge (page 7 of 12)

3 Availability and Accessibility of Appropriate Resources

There is evidence that:

A. Technology resources are available and are being used to support a variety of student and teacher experiences.

1	2	3	4
Few teachers and staff know what technology resources are available and how to operate them. Few technology resources exist. They have not been inventoried recently nor checked for operational status.	Some teachers and staff are learning to operate specific technology equipment. Some technology resources have been checked and inventoried by location and primary use.	Many teachers have received information on the technology resources available. Some teachers have used selected resources for instructional activities.	Most teachers are using a wide variety of the available technology resources.
Comments/Supporting Information:			

B. Technology has been allocated in such a way as to support its constructive use in the teaching and learning environment.

1	2	3	4
No plan exists to allocate technology resources to maximize the impact on teaching and learning. Location of existing technology resources is based on past use, initial program purchase, or personal request. Few, if any, teachers have expressed an interest in a change in the allocation of the technology resources.	Some discussions have occurred to design an allocation and replacement schedule to support constructive use of technology in the classroom, labs, and media center. For example, a school technology team is studying the current allocation of technology resources and the related allocation policies.	A plan is being implemented to allocate the existing technology resources for maximum use and impact on student learning. Work is in progress to design an allocation schedule for future purchases and routine upgrades. Individuals are identified to be responsible for maintaining this allocation process.	The technology resources in the school are available for just-in-time learning experiences, whether through a checkout standalone mode or by a networking environment. School staff has input on allocation of existing and new technology resources.
Comments/Supporting Information:			

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C. School individuals have equitable access to technology.

1	2	3	4
Limited access to the technology resources is available to the school staff during school hours and from school locations. Discussions may be occurring on extending access, from off-school sites and beyond the school day.	A group of school staff is testing access to school technology by checkout and by telecommunications after school hours and from homes. The school is developing policies on access to school technology by staff and students.	A policy exists for use of school technology by staff and students and has been shared. Guidelines on equitable use are being developed. As a result of the pilot testing, an expanded number of staff and students are now using school technology resources.	Technology resources are accessible to the school staff and students on an equitable basis and from off-site locations and beyond school hours. Access is based on policies in the school technology plan. Staff members are making routine use of the resources.
Comments/Supporting Information:			

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Technology Integration Progress Gauge (page 9 of 12)

4 Organizational Support

There is evidence that:

A. Organizational structure exists for support of all aspects of technology integration.

1	2	3	4
Within the school and the district, there is little to no organizational structure to support technology use or set direction for technology integration.	The need for support of technology integration has been recognized and school staff members have been assigned to provide minimal support. A group has formed to identify what type of support is needed for technology integration.	Individuals are identified to provide hardware and instructional support to staff. The school is addressing reports on or requests for support needed for successful technology integration.	School and district leaders have designated personnel and approved a process for supporting technology integration via training, maintenance, technical assistance, purchasing consultation, and instructional modeling. Periodic input on the support needed is gathered.
Comments/Supporting Information:			

B. Organizational capacity fosters transformations in school leadership to support technology and the changes it brings to teaching roles and methodologies.

1	2	3	4
No policies exist at the school or district level that encourage school leaders to use technology. Few opportunities occur for school leaders to gain technology skills or to witness use of technology in the instructional program at model schools or conferences.	School leaders are beginning to use technology for work and to participate in meetings and sessions on technology use in changing teaching and learning in the classroom. Discussions have occurred about developing policies on the use of and support for technology by school leaders.	Many school leaders are using technology routinely for their work and are supporting requests from teachers to gain technology skills or participate in events focusing on technology integration. The school is developing policies that will foster use by and support from school leaders for technology and change.	Policies exist and opportunities occur regularly from the district and/or regional level that encourage school leaders to be users of technology and to support technology in the instructional program. As a result, most school leaders routinely use technology themselves, initiate reviews of technology use, and encourage use by staff.
Comments/Supporting Information:			

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C. Policies exist that support the equitable availability and use of technology.

1	2	3	4
Neither school nor district policies exist on equitable availability and use of technology.	School and/or district policies have been developed for equitable availability and use of existing technology. Random strategies are being implemented to ensure equity.	A school plan for implementing technology to ensure equitable availability and use for teaching and learning is in place. Successful strategies for equity are being identified.	Schools are following district policies on equitable availability and use of technology. Technology activities based on equitable availability and use are incorporated into school improvement plans and staff professional development plans.
Comments/Supporting Information:			

D. Effective and ongoing staff-development opportunities exist to support capacity building for using technology to improve teaching and learning.

1	2	3	4
Although technology-based staff-development topics have been identified, only a few, unrelated technology-based staff-development activities have occurred.	Some technology-based staff-development sessions have occurred and initial activities resulting from the sessions have been tried in classrooms. Teachers have begun seeking ways to integrate technology.	A staff-development plan, including evaluation of student and staff needs, exists for using technology to improve teaching and learning. Some teachers are collaborating on best practices in using technology in teaching and learning. Teachers are being evaluated on their effective use of technology as a result of training sessions attended.	School and district administrators support continuous staff-development opportunities for improving teaching and learning, with seamless technology uses. A committee exists to provide long-range planning on technology-based staff development and sharing of best practices. Use of technology effectively is an integral part of the teacher evaluation process.
Comments/Supporting Information:			

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Technology Integration Progress Gauge (page 11 of 12)

E. Teachers and administrators use technology as an information management tool.

1	2	3	4
Although teachers and administrators are aware of information management tools, few, if any, staff members are using such tools.	Some school staff members have access to and have received training to use information management tools.	Many school staff members use information management tools for daily classroom tasks and for submitting reports and documents. Some staff members are seeking new tools and additional uses for existing tools.	Most school staff members prepare and submit reports and documents using information management tools as required by administrators. Many school staff members provide regular input on new tools needed.
Comments/Supporting Information:			

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Technology Integration Progress Gauge (page 12 of 12)

5 Community Involvement

There is evidence that:

A. Community supports the school's integration of technology in teaching and learning.

1	2	3	4
Plans may have been developed but not implemented to inform the community of the school's efforts to integrate technology.	Some segments of the community are knowledgeable of the school's efforts to integrate technology into teaching and learning.	Many community groups have plans in place and have begun activities to enhance the current technology integration activities of the school. Community members are meeting with school groups to plan technology integration activities.	Most community groups support technology integration into the school's teaching and learning environment by maintaining a consistent presence in school activities. Ongoing school committees are required to include community members.
Comments/Supporting Information:			

B. Community shares in the use of the school's technology.

1	2	3	4
Few or no plans exist for the community to use the school's technology.	Some school and community members are developing policies and strategies for community members to use the school's technology; e.g., for after-hours adult literacy training or e-mailing with teachers.	Several community groups are beginning to use the school's technology according to approved policies and guidelines.	The school and community members actively promote community groups' use of the school's technology.
Comments/Supporting Information:			

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Resources

Resources for Integrating Technology into the Curriculum

To help you further understand how technology is being integrated into the classroom, you can see what teachers have written about their work by going to the Internet. Online resources do not always have to incorporate telecommunications technology. Often, it is possible to find places where teachers have posted information about projects that in and of themselves use only stand-alone, non-networked hardware and software.

The following URLs are locations on the Internet where you can view entire lesson plans that make use primarily of applications technology such as spreadsheets, word processors, database management programs, and presentation tools. You may want to use many of these sites for ideas, and then proceed to adapt these ideas for your own classroom needs.

Integration

Online Resources with Specific Project/Lesson Ideas

http://www.schoollife.net/schools/ggl
What do you eat in your country? This site is an interdisciplinary project in which students can learn about other countries. Students go to a grocery store and compile a list of items, then put these items on a spreadsheet. Through e-mail and the Internet, students are able to compare the prices in different countries to their own. A variety of technology tools can be integrated within the project's activities.

http://www.microsoft.com/education/lesson/productivity/aknow.asp
The activity guide is organized first by major subject area (social studies, language arts skills), then into more specific categories (history, mathematics, and creative writing). The links will take you to a list of lessons organized by primary and secondary activity focus. Here you may choose to view individual lessons online or download a file containing all lessons related to the subject. The lessons make use of basic Microsoft productivity applications (word processors, spreadsheets, etc.). Most lessons would be adaptable to using any publisher's software, not just Microsoft's.

Sites that Compile Project Ideas and Resources

http://henson.austin.apple.com/edres/ccenter/curriccenter.shtml
Apple Computer's Curriculum Center is an excellent resource. It is organized by grade level and subject area.

http://www.kn.pacbell.com/wired/bluewebn/
Blue Webb'n is a site that links to several hundred curriculum projects, lesson plans, and general-curriculum resources that make use of Internet technology. The resources are organized by subject, grade level, and type and are ranked by a panel of reviewers. An excellent resource!

http://www.ed.gov/offices/OERI/ORAD/KAD/expert_panel/index.html
The US Department of Education has established its *Expert Panels* program to identify promising and exemplary educational practices. One panel has been devoted to identifying programs related to educational technology.

http://www.enc.org
The Eisenhower National Clearinghouse is a federally funded resource that links to resources for K–12 math and science teachers.

http://www.solutions.ibm.com/k12/teacher/activity.html
IBM has a well-organized site that supports K–12 teachers. Many of the activities are related to the Internet but can be adapted to nontelecommunications technology as well.

http://discoveryschool.com/schrockguide/
Kathy Schrock's Guide for Educators is one of the most comprehensive, best-organized guides to online resources available to K–12 teachers. This site is actually a subject guide to resources organized by curriculum area.

Print Resources

Sandholtz, Judith H.; Ringstaff, C.; and Dwyer, David C. 1997. *Teaching With Technology: Creating Student-Centered Classrooms*. NY: Teachers College, Columbia University.

Putting It All Together

A conversation about curriculum integration

What are most teachers actually doing with technology in the curriculum?
This is very interesting, and it would be great if more teachers could see what their peers were actually doing versus what the technology industry *hopes* that they are doing. Based on our observations in schools, we find that most technology-using teachers are using tutorial software applications.

I see this starting to change as more staff-development sessions focus more on *curriculum development and technology integration*, instead of technology training. It's not news, but it's *hard work* to figure out a valuable use of a spreadsheet or a World Wide Web resource that really warrants the use of that resource. Most teachers just have not had the time or been motivated to do that work. On the other hand, they've been told to use technology as a sort of blank directive. Without some serious work and reflection on curriculum and the value of technology in teaching and learning, most will go for the easiest known approach, which is to use prepackaged software targeting single curriculum objectives. So it's not surprising to see a lot of drill and practice, low-level technology projects, and electronic recess (playing games).

Fortunately, technology such as the Internet and productivity applications (word processors, presentation managers, etc.) are becoming so prevalent in both schools and the community that *students* are beginning to lead teachers in ... terms of suggesting ways that technology can be used in processes and procedures of learning. So we are beginning to see more use of World Wide Web resources, word processing, and electronic presentations by both students and teachers. When a student suggests that technology might be used as a tool for collecting, analyzing, or reporting some information, that student is demonstrating a keen understanding of the value of technology. I have met many teachers who are picking up on this trend and thus beginning to encourage a tool approach to technology. Of course, the problem is that not all students have access outside of school and thus are not making these suggestions. This is certainly the case in many of the disadvantaged communities that SEIR•TEC serves. In these cases, the teacher truly must lead the way. Therefore, improving the skills of these teachers becomes our biggest challenge.

What kinds of issues do you see confronting teachers working to integrate technology?
We'll talk about infrastructure—that is, hardware, networking, equipment, and that sort of thing—later. So putting aside infrastructure issues for a moment, let's turn directly to issues of curriculum.

We firmly believe that any exploration of technology integration absolutely must start with an examination of curriculum. In other words, what do we want students to know, and when do we want them to know it? If you don't have

definitive answers to that question, then you really have no basis for deciding what, if any, technology should be integrated. The curriculum and its alignment with either district or state standards is the key issue.

Teachers who are not masters of their curriculum often end up teaching technology for technology's sake. So often, in fact, that I've concluded that some teachers simply do not realize that they are *teaching* technology versus *integrating* technology. Simply stated, technology in itself is not a substitute for a well-designed curriculum. Furthermore, technology will not improve weak instruction or poor planning. As we have stated previously, the goal of technology integration is to *support* instruction with tools that bring new meaning to learning and discovery.

Since you mentioned it, what about managing the hardware as part of technology integration? I guess that's what you mean by *infrastructure*.
Well, this is actually the subject of Chapter 6, and that's probably the best place to fully discuss the issue. But, yes, managing hardware (infrastructure) represents a major problem to many teachers. This is why one of the first steps we recommend toward implementing technology is an inventory of available technology, including hardware and software. Many teachers assume that they have nothing. While this may be true in some cases, an inventory of available technology often brings some surprises. A good example of this is the belief by one of our school districts that they didn't have any good hardware, or software. Because of a strict policy limiting network access, teachers didn't know how to use what they had. However, after we spent some time with them, the teachers found that some of the technologies they already had could be used for instructional purposes.

First you talk about curriculum integration in a classroom context and then you talk about integration in the school or district. Is there a difference?
Good observation! Technology integration has both a broad meaning and a more specific meaning. In the broadest way, it means the use of technology every day by everyone to support work, leisure, or learning. Curriculum integration is more specific to classroom settings. For some schools, curriculum integration is synonymous with the broader definition of integration. However, you can choose to apply it to your situation as you see fit. But keep in mind that successful integration depends on a lot of things happening to support it—appropriate staff development, appropriate hardware and software, adequate funding, and communication. Our experience shows that integration is mostly about people and attitudes and has less to do with buying and installing hardware. After all, everyone in a school or district will be affected, one way or another, when technology is introduced.

Chapter

4

Professional Development Planning

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Professional Development Planning

Professional Development and Technology Integration

Professional development underlies all successful technology integration efforts. Research shows, and our experiences in SEIR•TEC confirm, that professional development must be substantial (approximately 30 percent of the overall technology budget), ongoing throughout the year, on-site, and just-in-time. To make this happen, professional development must be a major component of your technology plan.

We have found that most teachers are aware of the value of professional development for integrating technology into their professional practice. Nevertheless, the professional development we all too often observe is limited to very basic, and redundant, workshops on the mechanics of technology operation. Comprehensive professional development for technology includes not only the development of technical skills and knowledge, but also strategies for technology-enhanced teaching and learning, and for classroom management.

Tools in this Chapter

The following sections will serve as a starting point for making decisions as you develop a plan for professional development.

Steps for Planning Professional Development. From ascertaining staff needs to developing professional development offerings, *Steps for Planning Professional Development* addresses every important aspect of the planning process.

Technology Competencies for Teachers. A concise introduction to the process of adopting teacher technology competencies, the tool presents valuable information about criteria for creating teacher technology standards.

Guidelines for Adopting Teacher Technology Competencies. The guidelines provide direction for setting teacher technology standards that support both curricular and pedagogical goals.

Professional Development Models. Detailed descriptions of eight *Professional Development Models* are provided to assist in making informed choices about which instructional strategies to follow.

Professional Development Ideas and Strategies. The ideas and strategies comprise a set of relatively simple techniques to help put professional development plans into action.

Professional Development Idea Worksheet. Used in conjunction with the ideas and strategies in the preceding item, the *Professional Development Idea Worksheet* is designed to help make technology implementation a reality.

A Framework for Designing Professional Development. Adapted from a landmark text on designing professional development, *A Framework for Designing Professional Development* illustrates a four-step process for putting together a successful program.

Checklist of Professional Development Strategies. The checklist comprises fifteen professional development strategies as they apply to different stages of teacher development.

Making the Most of Professional Development. A collection of strategies for professional development implementation, *Making the Most of Professional Development* can help move the process beyond the planning and design stages.

Resources. There are a number of references throughout this chapter to valuable online resources. For your convenience, we have included a summary of these in the *Resources* section.

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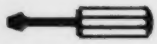
Putting the Tools to Work

Steps for Planning Professional Development



1. Survey your staff to determine their needs.

In most cases, professional development planners will find that teachers and administrators need training in a number of different subjects delivered in a variety of different ways. The best way to design professional development that meets different needs and accommodates different levels of expertise is to find out what people do and do not know and what they need to know, and then to develop offerings accordingly. Assessing needs and skills can be done by administering a survey. We have included a sample survey in the Appendix that you can modify for your own use. We suggest that you give respondents an opportunity to describe in their own words how they would like to use technology in their classrooms. Use this survey to help plan current and future professional development sessions.

Even if you determine that everyone on your staff needs to acquire the same basic information, some people will do just fine with a one-hour workshop, whereas others will need more time with one-on-one support. The point is, if your goals are to assist in developing the capabilities of your entire staff and being adaptable in how you facilitate that development, you will need to consider a variety of delivery mechanisms.

2. Determine where your staff lies along the continuum of various stages of *concerns* ranging from awakening awareness of technology and its potential impact to an advanced refocusing of existing skills and practice.

Technology is a remarkable innovation in many educational environments. However, bringing innovation to your staff may raise anxiety about how it will affect them as individuals and the way that they work.

When designing professional development, acquaint yourself with literature about the change process and how it relates to the adoption of an innovation. Even if you only have a little time to consider these underlying factors, it's well worth the effort. Understanding how to address individuals' concerns related to change and innovation will give you new insight into how to design effective professional development.

One model for understanding change is the *Concerns Based Adoption Model (CBAM)* (Hord, Rutherford, Huling-Austin, and Hall, 1987). The *CBAM* model was developed out of years of research on innovation and change, such as Everett Rogers' seminal *Diffusion of Innovations* originally published in 1973. Interestingly, Rogers' initial work, which focused on farmers and how they adopted new agricultural procedures, has formed the conceptual underpinning of many professional development efforts, including the SEIR•TEC academies. The *CBAM* model (and other developmental models of its type) holds that people normally move along a continuum as a change is being introduced and

implemented. Those who are considering or experiencing change will ask questions of themselves regarding the change. In early stages of the change process, questions are more self-oriented: What is it? How will it affect me? When these questions are resolved, questions emerge that are more task-oriented: How do I do it? How can I use these materials efficiently? How can I organize myself? Why is it taking so much time? Finally, when self- and task concerns are largely resolved, the individual focuses on impact. Educators will then ask: Is this change working for students? Is there something that will work even better? You can find a more detailed account of *CBAM* at the National Academy of Science web site at http://www.nas.edu/rise/backg4a.htm or obtain *CBAM* tools from Southwest Educational Development Laboratory at http://www.sedl.org/catalog/items/cha22.html.

Professional development aligned with *CBAM* takes into account the range of concerns—and hence patterns of adoption—present in any school or district staff. Also, through awareness of these concerns, you as a professional development planner can be more sensitive in searching out staff needs for different types of professional development.

Once you are aware of the range of *stages of concerns* (from the *CBAM* model), you can begin to find out where your staff lies on its continuum. This determination is best done through a variety of information-gathering strategies. As the literature on change tells us, no single communications mechanism will reach everyone; therefore, don't expect to gather all of your information via a standardized survey administered to everyone. Frankly, a survey may not be the most productive way for you to gather information on personal concerns. Think about how often you have heard someone say that they couldn't fill in the survey because they had no idea what the questions were about? This is indicative of someone at a low stage of concern and a low level of adoption. A much better way to accumulate this information is to spend time talking to staff and other informed participants.

Another way of obtaining information is to solicit feedback continually from participants once professional development sessions are underway. At the beginning of a new initiative, participants may not know what they need in terms of professional development, but as they become more experienced, they begin to have a clearer understanding of their needs.

After you have analyzed your information about staff members in terms of awareness, skills, and needs, you will be better informed when designing your professional development plan.

3. Create technology professional development offerings that address staff needs in both content and process.

After you have completed the necessary data gathering and analysis—for example, interviewing, surveying, investigation, reflecting—it's time to develop the professional development plan. This plan might be incorporated into your strategic technology plan or your district is comprehensive plan. Perhaps it might exist as a separate technology professional development plan (definitely the least preferable of all options). The point is that it should be a plan that takes into account a range of needs and circumstances, not just a list of workshops to be held.

Furthermore, if your district plans to incorporate technology-competency measures, you will need to design the professional development curriculum with those competencies in mind.

It is important to note that the distinctive difference about *technology* professional development, compared with other sorts of professional development, is the technology component and its requirements (hardware and software), as well as the qualifications of the person or persons who will be delivering it.

4. Determine where, when, and how professional development sessions will take place.

There are several issues to be considered regarding this item. Will a special technology training room or training rooms be needed? If so, how should it be equipped? Will there be such a room in each school, or will it be a district training room? Who will be responsible for delivering these sessions? Will someone new be hired? Or, will it be a teacher with a new assignment? And, most importantly, when will teachers be asked to attend these sessions? On the weekends or after regular school hours? Will substitutes be available for release time so teachers can attend during regular school hours?

Finally, and not least in importance, is *strategic pacing*. This means, who will receive computers first, and how will that be decided? How soon afterwards will they receive appropriate training? Will everyone across the school or district receive computers at the same time? Or will it take place in waves? One school at a time or one grade level at a time? Elementary first, then middle school, and then high school? Or will teachers have to write proposals requesting the technology they want to use in their classrooms?

5. Create a plan for strategic pacing that will coordinate installation and delivery of hardware and software with your professional development sessions.

From time to time, we hear administrators talk about the distribution of technology resources as an example of the chicken-and-egg problem. If you have limited funds (and who doesn't?), should you spend it first on hardware and software or on professional development? If you spend it first on hardware and software, the technology will probably be underutilized unless teachers and administrators are already technology-proficient. On the other hand, it's pointless to offer training before educators have the technology, because they will have forgotten what they learned before they have a chance to apply it. When having to make a difficult decision like this, we have found that it's a good idea do a phased implementation, i.e., to roll out the technology and the professional development about the same time, but to do it in stages. You might start with a particular subject area in which students stand to gain the most from technology-enhanced learning. Or, you could start with the grade level where the teachers are most ready and eager to get started. In some of the SEIR•TEC intensive site schools, the teachers who participate in professional development and implement what they use in their classrooms are the first to receive new technology. The point is to strategically plan the pacing for both the short term and long term.

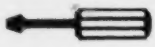
Technology Competencies for Teachers

When adopting teacher technology competencies, first consider the teacher's most basic priority, which is to help students learn. Therefore, the tools that teachers use—whether these tools are based in modern information technology (e.g., computers) or traditional technologies (e.g., books)—must first and foremost be the most appropriate to support their primary goal: effective teaching for effective learning.

There is a generally valid assumption that certain information-technology devices are very powerful teaching tools. Elsewhere in this book, we offer a number of resources detailing the instructional advantages offered by integrating technology within the instructional environment. In addition, just as with any other information-age profession, teaching can benefit from the many labor- and time-saving advantages that technology can bring to the processing of administrative information. Thus it is indeed important that teachers be able to use a variety of basic technology tools in both their instructional and administrative roles.

At the same time, it is also important to remember that access to all of the tools in the world will not automatically make a mediocre teacher a good teacher. Effective use of technology allows a teacher to adopt better instructional practices. However, technology alone will not help a teacher who does not have a sound understanding of how students learn and how best to address students' needs and learning styles. Understanding this basic sequence—first the learning, then the teaching, then the technology—is essential to the process of creating teacher technology standards (not to mention the entire process of technology planning!). Underlying the various statements about what sorts of tools teachers should know how to use should be a requirement that teachers understand what tools are most appropriate for a given teaching task. This implies that the teacher have an underlying understanding of learning theory (such as constructivism), pedagogy, and the curriculum.

Guidelines for Adopting Teacher Technology Competencies



Technology competencies ought to be about setting the standards for the use of technology tools that support both the curriculum and good pedagogical practices.

- **Teacher technology competencies must be linked to pedagogical competencies.** For example, it does not make sense to expect a teacher to use communications technology (e.g., the Internet) to support cooperative learning if the teacher has not developed an understanding of what cooperative learning is or how to manage a cooperative-learning environment. Technology is just a tool and not an end in itself. When teachers are mandated to master tools for tasks they do not understand, they will do their best to avoid the situation. Don't offer technology training without including strategies and ideas for applying new knowledge and skills in the classroom.
- **Teacher technology competencies are really part of the *professional development* component of your strategic technology plan.** If you adopt competencies as part of your professional development plan, your training and support will help teachers attain these competencies. When viewed this way, acquiring competencies becomes a *goal* of the professional development section of your technology plan.
- **Teacher technology competencies must be linked to the availability of technology infrastructure.** Often, we see standards that require teachers to use technologies to which they have insufficient access. Remember that access must be defined practically and not just politically. For example, a *single* Internet-connected computer in a school media center does not constitute access to the Internet for all of the teachers in that school. It is perfectly reasonable—and quite desirable—to create competencies that escalate over time and are in sync with the growth of your district's technology infrastructure. What might be science fiction with today's infrastructure might be perfectly ordinary with your infrastructure three years from now. Once again, technology plans are about *strategy,* and strategy unfolds over *time.* Therefore, competencies can be developed over time.
- **Teacher technology competencies should be related to *basic* applications and systems.** Here again, the goal is to cover the broadest range of possible situations. Teachers should be held accountable for using basic tools such as word processors, spreadsheets, the Internet, an integrated learning system, multimedia, and administrative systems. Equally important, they should know how to select and use instructional software that will help students develop cognitive skills, learn academic content, and meet state standards. In most cases, professional development should not focus on teaching teachers about a specific brand of software, curriculum package, or type of computer, because these quickly become irrelevant as technology advances and teacher assignments change.

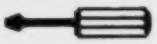
- **Teacher technology competencies should be described in understandable terms.** At a minimum, a competency statement should clearly define the expectation for what a teacher should be able to do. Consider, however, how much more helpful it would be to have an example of what a teacher would actually do to fulfill the expectation. This places the competency in real-world terms and helps the teacher understand what is required to meet the expectation. Furthermore, through the process of creating examples, you as a planner or policymaker will be able to gauge just how reasonable your expectations are within the limitations of your situation.

Teacher Competency Examples

The following examples from state departments of education, research groups, and individual school districts represent the wide range of thought related to teacher technology competencies. As with all aspects of technology planning, it is important to check with your state department of education *first* to determine if there are specific guidelines or frameworks to which you must adhere.

- ISTE, the International Society for Technology in Education, has developed a set of standards that can be applied to all professional education programs. By design, these competencies are to be a part of preservice education (and have been adopted by the National Council for Accreditation of Teacher Education), but often we find that states and school districts are setting them as competencies for in-service teachers. The ISTE standards can be viewed online at the ISTE web site at http://www.iste.org/Standards/index.html.
- The North Carolina Department of Public Instruction (the state department of education) has developed an exhaustive set of beginning and advanced teacher technology competencies. These can be found online at http://www.ofps.dpi.state.nc.us/OFPS/hm/te/techcomp.htm.
- The Lexington (Massachusetts) Public Schools have approached the issue of teacher technology competencies by defining a set of basic skills that all teachers must master as a way of attaining integration of technology within the district's curriculum (and state curriculum frameworks). Lexington has taken an interesting approach to the process of offering the professional development and support necessary to attain these skills. For more information on Lexington's standards, skills, methods, and resources, visit them online at http://lps.lexingtonma.org/Tech/Kansas/index.html.
- Bellingham (Washington) Public Schools have developed the *Staff Use of Technology—Self-Evaluation Rubric* based upon the *Mankato Scale* originally developed by the Mankato (Minnesota) Public Schools. See it online at http://www.bham.wednet.edu/tcomp.htm.

Professional Development Models



There are many strategies—and pitfalls—when designing a professional development program. Some districts may use a single approach, while others may implement a variety of approaches. Just as classroom teachers have found that they need to use a variety of instructional strategies to accommodate different learning styles, staff developers have found that they need to accommodate the various ways teachers approach the materials they present. We have found that single-session attempts without any relationship to classroom application or follow-up are the least effective approach. They are also the least cost-effective in terms of what teachers learn and what they take back and implement in their teaching.

In order to address the deficiencies of a workshop-only approach to professional development, some school districts have developed models that combine baseline data for teacher technology use, principles of constructivist learning, strategies for collaboration, and opportunities for exploration and practice. These forward-thinking districts are modeling a variety of strategies for technology professional development. These professional development models focus on achieving meaningful outcomes instead of focusing only on learning skills. Skills are learned in context and are therefore more meaningful, and greater control is placed in the hands of the learner. In this section, we describe these innovative models as well as the traditional *workshop* and *hands-on lab* models.

Workshops

Workshops are a commonly used vehicle for delivery of professional development. While we have experienced—and conducted—hundreds of workshops, we feel that this approach tends to be overused. Planners often find workshops to be expedient and so do not consider more effective ways to deliver professional development. Just as with any teaching method, a workshop is helpful for some but not for all. Frequently, workshops become professional development *events* and do not have the follow-through necessary to create impact over time. To make the most out of workshops, we suggest that you refrain from offering the one-shot "everyone come today and learn all about it" kind of session. Sometimes these tend to be too long, creating information overload and failing to engage the attention of participators. Rather, we recommend formulating workshops as a series of related topics that build upon each other, have follow-up activities, and involve some problem solving and collaborative activities. In effect, this means that you will need to carefully design a technology professional development *curriculum* that flows out of your professional development and technology plan.

Hands-on Labs

Conducting technology training in a laboratory setting where all participants have access to a computer is another common practice. This approach can be very effective if the learning activities are planned carefully and the trainer is skilled in this approach. Sometimes this approach becomes a lengthy technology showcase with the participants learning very few applicable skills or concepts and going

away with information overload. When you use a laboratory setting, we recommend that brief demonstrations be followed by opportunities for individual exploration and practice. The lab approach is most effective if the training is offered in short sessions spread over a period of time. This gives participants an opportunity to practice between sessions and explore what they have learned.

Train the Trainer

The Train the Trainer model is used more frequently in schools and school districts where there is a need to scale up or disseminate a professional development effort quickly. The main idea is to train a small number of people who are then expected to share what they have learned with others. The distinct advantage of this model is that it empowers more individuals by spreading the control of professional development over a larger group. Also, it provides the opportunity for creating a better match between the professional development topics, the trainers, and the participants, which, in some cases, creates a peer-mentoring situation. As we said in the Lessons Learned section of Chapter 1, however, the Train the Trainer model is often seen as a relatively inexpensive way of training lots of teachers. When implemented with this goal in mind, we have noticed that the model seldom works, because the cost savings come about by eliminating some of the model's most critical elements. In particular, the key trainers (those who receive the initial training and are expected to conduct turn-around training) are seldom allotted the time and resources necessary to develop their own knowledge and skills before they have to lead training. There are also concerns about the quality of training that key trainers receive and their experience as trainers. If someone is a good teacher, it does not necessarily follow that they will be a good trainer. In a similar vein, we have found that expertise in technology does not automatically translate into effectiveness as a trainer. When all is said and done, the Train the Trainer model can work well, but it has to be thoughtfully planned and implemented.

Learning Teams

Based on the assumptions that teachers learn best when they can construct their own knowledge and that the best resources for teachers are often other teachers, some districts have created collaborative learning groups or teams for technology professional development. Lexington (Massachusetts) Public Schools, for example, call their groups *learning teams*. These teams are the focal point of the district's professional development efforts for both technology and a wide variety of other topics. During their first year of working with learning teams (1997–1998), Lexington schools organized 300 elementary- and middle-school teachers into eight-person teams. Learning teams were organized by grade level, building level, and/or curriculum focus (e.g., foreign language, math, science, social studies, etc.). There were actually quite a number of different team configurations, but all of the groups had a common reason for being.

The goal for the elementary- and middle-school teams during the first year was to master a set of basic information-technology competencies. Therefore,

the initial team function was to learn basic how-to technology skills. During the second year, the teams were expected to begin integrating technology into their curriculum. Each team focused on developing its members' technology competencies in a way that the group as a whole found useful. That meant that different groups dealt with different issues and topics as they saw fit. When the group members felt that they had had enough of a particular subject, they moved on and focused on the development of another skill or competency. By the end of the 1997–1998 school year, *all* elementary- and middle-school teachers had mastered the basic skills; but the paths they had used to attain that mastery differed from one group to the next.

Each of Lexington's learning teams had a team leader who received training (by out-of-district trainers) on the basic tools and facilitation/team leadership skills. This training was offered during professional development release days early in the school year and spread over several months. It could have been offered as a summer professional development institute, and this would have accelerated the district's efforts. After their initial training, team leaders began to meet with their teams. These team meetings were also held during designated district professional development days as well as after school on a schedule determined by each team.

Perhaps equally important to skill mastery was that the learning teams fostered an environment of cooperation and collaboration. Team members were encouraged to meet outside of designated team time and to use each other as their first-line technology support. In this regard, it became even more important that teams be constructed around commonalties among team members. Success was realized when teams were based in existing grade/building/subject area designations.

Not surprisingly, the district found that having learning teams is a viable strategy. End-of-the-year evaluation showed that the vast majority (over 90%) of all elementary- and middle-school teachers had achieved the district's desired level of competency in using basic technologies. Furthermore, the approach was deemed worthy to be continued as the professional development model for the integration of technology into the curriculum.

The following are key elements of the learning-team approach:

- **Team leaders are trained in technology and team facilitation skills.** This takes the form of Train the Trainer sessions that can occur in a workshop or academy setting. The duration of team-leader training depends on the existing skill level of the designated team leaders as well as the curriculum in which they are being trained. Team leaders should be selected for their leadership abilities and should be rewarded, if possible, for the time they have spent.
- **Learning teams are assembled.** Each team has a team leader, and its members should all have a common interest beyond their need to learn to use technology. Teams can be grouped in various ways, but it is critical that the team is able to communicate freely and work collaboratively.

- **Learning teams meet to work on their chosen topics, as well as the overall professional development agenda suggested by the team leader.** Teams should be asked to chart their anticipated progress, set milestones, and define criteria for their anticipated success. It is critical that teams be given time to meet! The learning-team approach is not a time-saver compared to traditional workshop-based professional development. Rather, it is simply a different approach, and one that is more promising in terms of its success rate.
- **The structure, content, and outcomes of the approach must be formatively evaluated.** Not all teams are successful, and sometimes unsuccessful teams need to be restructured. Also, in a constructivist approach such as this, it is important to keep overall learning goals and objectives in mind (i.e., left entirely to themselves, teams can easily go off task). Therefore, it is important for the district to keep a close watch on progress of the overall effort and individual teams. The creation of a formative assessment procedure, i.e., evaluating events and strategies while they are still going on, is very helpful. The results of this evaluation should be reviewed with an eye towards making continuous, ongoing improvements in the approach.

One final note: The overall effect of the team approach is that the district technology coordinator moves away from a role focused entirely on *delivering* technology professional development and instead becomes a planner and implementer. The logistics of training delivery for teams is more complex than simply delivering workshops. Planning, evaluation, and support are imperative. While learning teams cause a shift in priorities for some individuals (e.g., the district technology coordinator and the district professional development coordinator), they do result in each teacher receiving much more professional development experience than would be possible otherwise. In Lexington, 300 teachers received over 30 hours of technology professional development *in a single school year*; it would have been impossible to give 300 teachers 30 hours of workshop time.

For more information about Lexington Public Schools' learning-team approach to technology professional development, visit their web site at http://lps.lexingtonma.org/Tech/Kansas/.

Mentoring

Mentoring is another model for professional development. This strategy came to the nation's attention through the 21st Century Teachers Network. This program was founded by a consortium of educational-service and professional organizations to support teacher technology leaders and is currently primarily operated by the McGuffie Project. The network offers support—in the form of workshops, online resources, and peer discussion groups—to teachers who can in turn become teacher leaders within their schools. In previous years, the network has offered teacher training on a variety of technology-skills and leadership issues. Participants are asked to form and lead a cadre of technology-using teachers back in their schools. In essence, the network provides a sort of team leader training (see above) to its participants.

One key aspect of the 21st Century Teachers Network is that it promotes and supports mentoring. Just as with learning teams, the idea is that effective professional development is personal, available when you need it, and offered by peers. Mentoring fits all of these requirements. 21st Century Teachers Network mentors are asked to mentor five individuals in their home schools. For more information on the 21st Century Teachers Network, visit them online at http://www.21ct.org/sit08_pub/owa/main.

By no means is it necessary to join an organization such as the 21st Century Teachers Network in order to begin incorporating strategies such as mentoring in your school. You may consider the creation of mentoring relationships as a follow-up strategy to all technology professional development. It is important, though, that you provide training to mentors in both leadership and mentoring skills. Some good online resources for mentoring are the Telementoring Web at http://mbhs.bergtraum.k12.ny.us/mentor/, which deals with telementoring (using technology tools to facilitate the mentoring relationship) and contains a number of links to mentoring resources and other telementoring sites. *Yes, You Can*, at http://www.ed.gov/pubs/YesYouCan/, is a guidebook for establishing mentoring programs. While this guide is specifically about creating programs to support college-bound students, it has a range of resources and ideas applicable to other types of mentoring.

The Authentic Task Approach to Professional Development

The Authentic Task Approach (ATA) was developed by SEIR•TEC partner Learning Innovations at WestEd and has been adapted for use in a number of SEIR•TEC professional development activities. The ATA is a professional development design that capitalizes on our need to learn continuously while tackling our real-world work. It is the ultimate version of "learn while you earn" and can be applied in virtually any content area. On one level, the ATA is a structured approach to doing a task, and therefore could be easily mistaken for a simple eight-step approach to problem-solving. This first dimension is extremely efficient in and of itself, and it is appealing to busy, task-oriented people who feel they never have the time they need to accomplish their work. The more powerful dimension, and what makes the ATA a true learning design, revolves around the way the approach is used. Several key features, such as presence of a trained facilitator, protected time, a resource-rich environment, collaborative work, and opportunities to reflect, produce the greater likelihood that deep learning will occur as the approach is used. The tension and balance between simultaneous learning and doing is what makes the ATA such a powerful strategy to promote learning and change.

The ATA is a design for professional development that provides participants, usually in teams, with an opportunity to identify a real task that needs to be done in the context of achieving a larger goal. The participants engage with eight elements as a structure to doing their work. As they pursue their task, they capitalize on resources, and they work toward the completion of their task in a way that promotes deeper learning composed of knowledge, skill, and understanding.

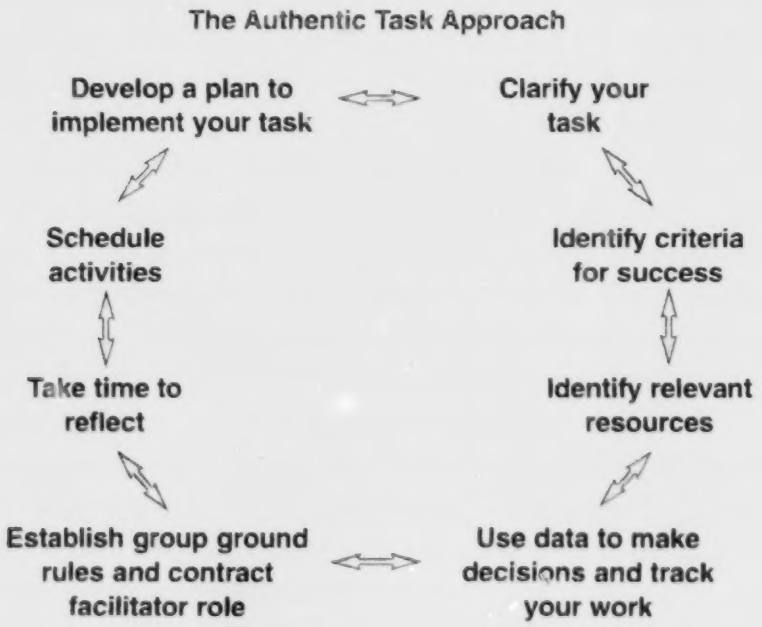
The eight elements of this structured approach can be thought of as steps; however, they are not really sequential. In fact, you can enter into the process at any point and move to any other point; therefore, they are best represented in a circle, as shown in the following diagram.

While the process is very flexible, participants usually are most effective if they begin by clarifying their task and coming to a common understanding about what it is, what the product will be, why this work is important, and what success will look like. While you can start anywhere and move anywhere, exactly how you move through the approach depends on whether you are doing so as an individual or as a team, whether you have a facilitator who is not pat of the team but is fully available to work with the team, and, most importantly, what you are learning. Capitalizing on the learning may take the team in a different direction from that originally planned, an that may be the most productive path.

Context in Which the ATA Can Be Used

While the most common format for the use of the ATA is with a team at an institute, we have learned that the approach can be used equally powerfully with any team in any location as the team members work over time. In addition, the basic approach can be used by an individual tackling a task and can evolve into an approach to working and learning in any environment.

Past uses of the ATA have included: working with large institutes in which multiple school- or community-based teams participate and work on their improvement initiatives; working over time with schools planning to adopt a school-wide Title One model; and the adoption of the approach by a large state teachers' union which is using the model to promote high-quality professional development.


The Authentic Task Approach
Develop a plan to implement your task
Clarify your task
Schedule activities
Identify criteria for success
Take time to reflect
Identify relevant resources
Establish group ground rules and contract facilitator role
Use data to make decisions and track your work

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The research base on which the ATA has been developed includes research that shows that learning is a strategic act most efficiently employed when the learner senses the need for it. The ATA design models effective professional development in that it is grounded in the principles of results-driven education, is connected to systems thinking, and takes a constructivist approach (Sparks, 1994).

The ATA lends itself to professional development focused on any number of different topics and can yield any number of kinds of products, such as plans, proposals for funding, policy documents, curriculum units, or a mapping or alignment process. Because it is suited to teams of people working at different stages of any given process, the eight elements can be used in a basic operation such as helping a team ground itself in student-achievement data as a means of deciding where to focus improvement efforts, or more complex processes such as revising a technology plan with input from stakeholders or designing an evaluation of some current initiative.

Experience with the ATA and the SEIR•TEC Academies

SEIR•TEC has developed a program for professional development that is based on the ATA model. Starting in the summer of 1998, the Summer Academy was piloted with eight cross-role teams from around the southeastern region. Each team came with its own problem and worked with facilitators to produce a design for implementing a technology-integration program back home. A team from Pinellas County, Florida, for example, developed an evaluation plan for its technology program. Another from Jordan Hill Elementary School, in Griffin, Georgia, developed a school-wide plan for using technology in ways that build on existing curriculum and sound instructional practices. In 1999, SEIR•TEC increased its offerings to serve the needs of teams from schools and state education agencies. We also use the SEIR•TEC academy model as the basis for academies for higher-education faculty through SERVE's SUNRAY project, a PT3 catalyst grant. Most recently, we have been collaborating with state technology directors and their staffs to implement the model throughout several states in the region. Each four-day academy is tailored to provide for the needs of the participating teams, with a special emphasis on leadership development.

Informal Professional Development

Not all professional development takes place in group settings. In fact, teachers' most meaningful experiences tend to be those in which they learn from their colleagues, especially when it comes to translating what is learned in a workshop into everyday classroom practices.

- **One-on-one and Just-in-time training.** We have found that one of the biggest concerns of teachers after they finish their formal technology training is "Whom do I call for help when I'm back in my classroom?" The key element to this approach is having an on-site support person in each school who is available to answer both software and hardware questions. The ideal person for this job is someone who knows both curriculum and technology; however, finding a person with those qualifications may be difficult.

Therefore, some schools have both a technology support specialist and a curriculum/technology specialist. Furthermore, we have found that planning for, and keeping, an on-site technology support person is one of the key strategies for successful technology integration.

- **Peer coaching** frequently takes place on-site between teachers who teach similar subjects, teach the same age group, are located in rooms close to each other, or are professional colleagues. This form of training is perhaps the most beneficial because it is the most personal. Some schools have gone so far as to assign a buddy system to create a peer coaching network.
- **Self-study** can occur through peer coaching, one-on-one, or mentoring opportunities. Frequently teachers will take college classes or other outside training courses as part of their personal improvement plan. Teachers who use this approach are usually very self-motivated.

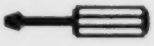
Online Professional Development

As more teachers and administrators gain access to the Internet, we are seeing a growing interest in online professional development. To some extent, the formats are electronic versions of traditional models, such as college degrees and certification programs, courses, workshops, and learning communities.

- **Degree and certification programs.** Teacher-education programs across the country are offering a plethora of degree and certification programs online. For example, Lesley College at http://www.lesley.edu and Pepperdine University at http://gsep.pepperdine.edu offer courses focusing on educational technology. The teachers we know who have taken online courses say that they like being able to work on the courses at home, but they miss the collegiality that is often created when they meet face-to-face for several weeks. With the advent of the US Department of Education's Preparing Tomorrow's Teachers to Use Technology program at http://www.pt3.org, which supports technology integration in pre-service teacher education programs, we can expect the growth in online courses and programs to continue.
- **Online courses and workshops.** A growing number of companies offer online courses and workshops on a variety of subjects. For example, Apple Staff Development Online at http://ali.apple.com/nshelp/welcome.shtml; T.H.E. Institute at http://www.thejournal.com/institute; and WebWorkshops at http://www.webworkshops.com offer courses and workshops focusing on integrating technology into teaching and learning.
- **Learning communities.** There are also numerous web sites offering informal professional development in the form of discussion groups, chat rooms, and message boards. Some have a particular focus, but most cover a variety of topics. The 21st Century Teachers Network at http://www.21ct.org focuses on the development of teacher leaders who mentor others as they collaborate and share teaching practices. TechLEARNING.com at www.techlearning.com offers threaded discussions and databases to help educators locate resources such as software, web sites, and conferences.

While the notion of learning online can be exciting, technology planners should know that it isn't for everyone. Some people simply don't have the stick-to-it drive necessary to complete a course or workshop that goes for several weeks. This applies especially for those who get frustrated when they encounter technical glitches in working online. Another thing to consider is that if you are thinking about online professional development as a means to save money, you ought to read the research on distance education, which suggests that online professional development might not be a cost savings at all. Finally, look before you leap. As with any professional development, you should look beyond the novelty aspects of online learning and consider the instructional design and content of what is being offered. The bottom line is, will this kind of activity help teachers learn the skills and acquire the knowledge they need in order to use technology to enhance teaching and learning?

Professional Development Ideas and Strategies



There are no easy answers for how to inspire and develop widespread technology integration in your school. Nevertheless, we have found that there are some relatively simple techniques that teachers and administrators can use to advance from the just-getting-started stage to one wherein a larger number of teachers are users and integrators of technology. Some of these ideas follow.

Mostly for convenience, we've separated the list into actions that are more teacher-centered and activities that are more administrator-centered. Nevertheless, most ideas involve the work of *both* teachers and administrators for successful implementation. Read both lists if possible.

Following the lists, we've included a *Professional Development Idea Worksheet* you can use to chart and more fully develop one of these ideas in your school.

For Teachers

- **Develop a common vocabulary.** Not everyone has the same definition for the term *technology integration*. For some, it means teaching kids about computers. For others, it means teachers using technology to support learning within the curriculum. We've found that most people are somewhere in between. A common vocabulary will help everyone keep his or her sights on the same goals. We offered our definition of this term in Chapter 3.
- **People learn through example.** You can talk all day about how *you* use technology with your students, but what does this actually look like? Rather than trying in vain to explain what you're doing, why not invite other teachers into your classroom or laboratory to see what you're doing?
- **Offer to model a lesson or unit.** Some schools and districts have established a regular program in which teachers work with students to model promising and best practices for their peers. Even in a less structured way, this would work in most schools. Offer to teach a lesson—using technology—to a teammate's class. Make sure that your teammate stays in the room to watch what

you are doing and to observe his or her students' response. If possible, ask your administrator if there is a small budget for substitute teachers to take over your class while you are teaching someone else's class. Many grants fund substitutes for this purpose.

- **Encourage student advocates.** If you are using technology successfully with your students, make sure that your students are aware of what you are doing. Have a discussion about how technology has impacted *their* work and learning. Remember that students often take for granted the tools that *teachers* consider so novel. Encourage your students to think and talk about how technology could benefit the work that they do in other classes, and then encourage them to share these observations with their parents and other teachers.
- **Share your work with parents.** Parents want to know how technology benefits their children's learning. Rather than waiting for a parent to come to you asking if technology has made a difference, you should go to the parent *first*. Talk about why you believe technology has positively impacted their child's learning and what you need from them to continue this impact. Be realistic; technology doesn't solve all learning problems or reach all students equally well, but make sure you point out successes where you find them. If you are a technology-using teacher, a discussion of technology should be woven into all regular parent conferences.
- **Contact community and business members.** Be prepared to talk to members of your community who want to know about what you are doing that helps students learn.

For Administrators

- **Make sure that technology is interwoven into all professional development.** When hiring staff developers (particularly outside consultants), make sure that they touch upon the subject of technology and can speak fluently about how technology impacts the subject they are discussing. In fact, beyond the initial "how to use an application" type of teacher workshop, this is how *all* technology professional development should ideally be delivered—that is, as part of some other broader topic. At an even more basic level, we note that in this day and age no trainer should work solely from typed overhead transparencies and poster board. Your trainers should at the very least be able to model the type of technology you wish your teachers to use with their students.
- **Retain your district technology committee.** Some schools and districts make the mistake of disbanding the technology committee, or allowing it to drift apart after the initial creation of the technology plan. The committee has several important, ongoing roles, such as overseeing the implementation of the plan, updating the plan annually, and conducting or reviewing evaluation activities and findings work.

- **Sponsor and encourage teachers to visit other districts.** These visits do not have to be limited to showcase technology sites! Rather, teachers can benefit from seeing how other typical schools integrate and support technology. Likewise, you should return the favor and offer your schools as places to visit to teachers from other districts.
- **Personally model the use of technology.** We've all heard about the superintendent who started to send out memos only via e-mail. That may be a bit drastic for some administrators, but the point is well-taken. Teachers will see no reason to use technology that administrators do not take the time to use and master. Suggestions for modeling include using e-mail, sharing information from e-mail and the web with staff at district meetings, taking an active interest in the development of district and school web sites, and participating in teacher technology training and professional development. Remember that the idea is to *actually use* technology, not simply to direct its use by others.
- **Encourage the development of student technology showcases.** Encourage teachers and students to display work that demonstrates technology integration at school open houses and other events where parents and community members come into the schools. After all, these people have paid (in one way or another) a lot of money for this technology; show them how it's being used!
- **Hold a community meeting to discuss your district's technology plan.** You spent months writing the plan, so isn't it important to share your plan with the community? Have teachers and other technology committee members present key parts of the plan. Lead discussions about how it will be implemented and how it will impact students. Don't just present, but lead discussions and encourage a community dialog. Make sure that these discussions are recorded in some fashion for all teachers to review afterwards.
- **Be prepared to talk with business and community leaders regarding what's working to benefit students' learning.** Where are you with your efforts, and what more do you need? Can community collaboration help you achieve your goals?

Professional Development Idea Worksheet

Taking an idea for professional development from the previous pages, work out how you could implement it in your school or district. To assist in this process, we have provided this worksheet which reminds you of the various supports, materials, and hooks you might need to make technology implementation a reality. A blank version of this worksheet is included in the Appendix.

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Appendix

Professional Development Idea Worksheet (page 1 of 4)

Integration Idea

_____

_____

_____

_____

Impact

(It's not necessarily true that every idea will impact each of the following populations, but if your integration is truly systemic, there's a good chance that it will. In a sentence or two try to describe how your idea for technology implementation will impact each of the following.)

Impact on Teachers

_____

_____

_____

Impact on Students

_____

_____

_____

Impact on Administrators

_____

_____

_____

Impact on Community and Others

_____

_____

_____

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Planning into Practice

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SEIR•TEC Appendix

Professional Development Idea Worksheet (page 2 of 4)

Hook to your District (or School) Technology Plan
(All aspects of technology integration should be reflected in the vision and goals of your strategic technology plan. Describe below how your idea for integration supports one or more goals in your technology plan.)

_____

_____

_____

_____

Who's Responsible?
(Who will take the lead responsibility on various aspects of your professional-development idea? Once again, not every idea will have all of these aspects, but most will.)

Professional Development

_____

_____

_____

Technology Infrastructure (hardware, software, and network installation, maintenance, support, etc.)

_____

_____

_____

Communication/Documentation of Success (Who's going to tell your community about the outcomes from implementing this idea?)

_____

_____

_____

Other

_____

_____

_____

Planning into Practice

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Appendix SEIR•TEC

Professional Development Idea Worksheet (page 3 of 4)

Timeline
Use this space (or another sheet) to create a step-by-step procedure for implementing your idea.

Who?	Does what?	When?

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SEIR•TEC Appendix

Professional Development Idea Worksheet (page 4 of 4)

Evaluation and Reflection

Nothing fancy here, but just take a moment to describe how you will know whether you were successful in the implementation of your idea. Will there be interim project benchmarks? Will there be something that you can qualitatively describe or quantitatively count as outcomes from your idea?

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A Framework for Designing Professional Development

In their landmark text, *Designing Professional Development for Teachers of Science and Mathematics,*[1] Susan Loucks-Horsley and her colleagues provide guidance for those who have responsibility for designing or conducting professional development programs or initiatives. While the publication is targeted to professional developers for teachers of science and mathematics, others at Learning Innovations at WestEd, a SEIR•TEC partner, have adapted the design framework to support professional development for teachers in other content areas. Based on a set of principles that apply to a variety of content and process areas, this design framework can help those responsible for professional development go from fragmented and limited professional development offerings to a more systematic and systemic approach.

The accompanying figure illustrates a design framework that organizes these elements to suggest both how to design a new program and how to analyze the design of an existing program. The four boxes through the middle of the framework represent a typical process of planning and action. This process helps designers of professional development—which should include teachers, administrators, community and other resource people—to think about several important features of good programs:

1. There needs to be a set of goals—a set of clear and shared outcomes for the program. These goals must drive all other elements of the design.
2. There needs to be planning—careful consideration of how the pieces fit together and how to proceed over time.
3. The plan needs to be implemented.
4. There needs to be continuous reflection on and evaluation of progress that feeds back into adjustment of plans and subsequent actions, as well as adjustment of goals.

This four-step cycle is meant to repeat itself, taking place over months as a program proceeds, or in the minutes it takes to monitor and adjust an ongoing event to increase its effectiveness.

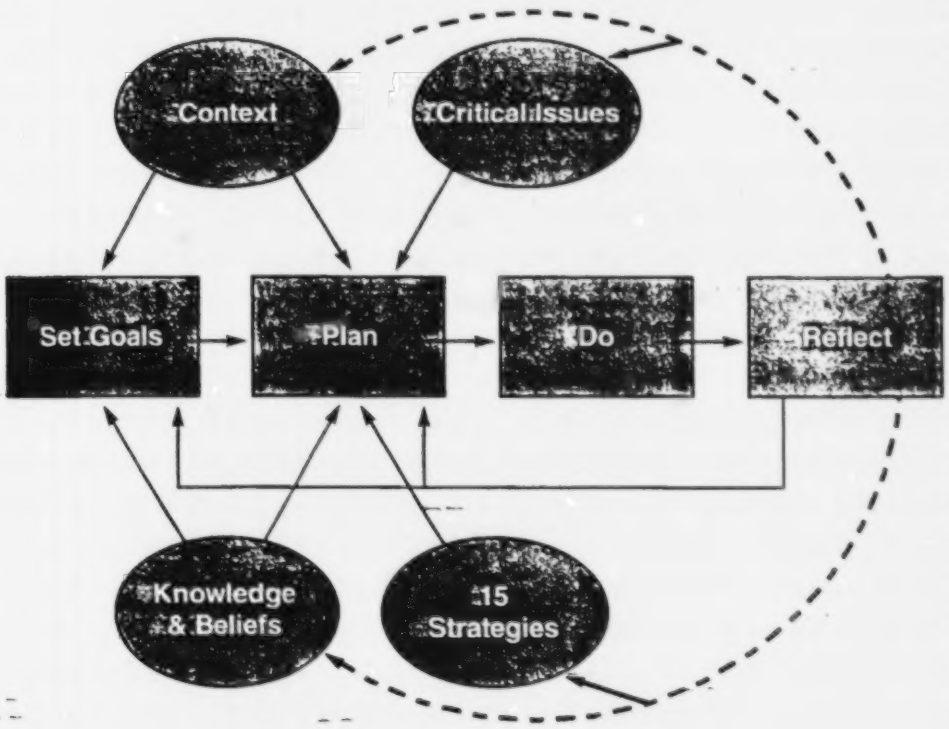
In addition to the four central steps of the cycle, the design framework considers four inputs important to the design process. Designers of professional development need to draw upon:

1. The existing base of knowledge and beliefs about learning, teaching, the nature of particular content and process areas, professional development, and the process of change.
2. An analysis of the context in which teachers teach and their students learn.
3. A set of critical issues that can make the difference between success and failure.

---

[1]The above text has been adapted from *Ideas That Work: Mathematics Professional Development* by Eisenhower National Clearing House (ENC), The Ohio State University, 1998.

Professional Development Design Framework



4. A repertoire of strategies for professional learning that can be combined in different ways at different times to maximize different learning goals.

Those looking for a single, definitive model of professional development will be disappointed that none exists. Every situation and initiative requires its own unique model. But this does not mean that each program needs to start from scratch. As explanation of this design model indicates, there is a broad and deep base of information, research, and, indeed, wisdom that can be drawn upon to build unique and successful professional development opportunities for teachers.

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Checklist of Professional Development Strategies

In the table that follows, we list fifteen professional development strategies and assess their applicability to different stages of teacher awareness and development.

Those strategies which have a *primary* relationship are given an "●"symbol whereas *secondary* strategies have an "○" symbol.

A Strategies that focus on developing awareness are usually used during the beginning phases of a change. The strategies are designed to elicit thoughtful questioning on the part of the teachers concerning new information.

B Strategies that focus on building knowledge provide opportunities for teachers to deepen their understanding of mathematics content and teaching practices.

C Strategies that help teachers translate new knowledge into practice engage teachers in drawing on their knowledge base to plan instruction and improve their teaching.

D Strategies that focus on practicing technology help teachers learn through the process of using a new approach with their students. As teachers practice new moves in their classrooms, they deepen their understanding.

E Strategies that provide opportunities to reflect deeply on teaching and learning engage teachers in assessing the impact of the changes on their students and thinking about ways to improve. These strategies also encourage teachers to reflect on others' practice, adapting ideas for their own use.

Strategies for Professional Development

The following checklist is adapted from *Designing Professional Development for Teachers of Science and Mathematics* by Susan Loucks-Horsley, Peter Hewson, Nancy Love, and Katherine Stiles. 1998, Thousand Oaks, CA: Corwin Press.

Purposes:
A = Developing Awareness, B = Building Knowledge,
C = Translating Into Practice, D = Practicing Teaching, E = Reflection

Strategies	A	B	C	D	E
Immersion					
1. Immersion in solving problems Engaging in the kinds of learning that teachers are expected to practice with their students, such as inquiry-based mathematics investigations.	○	●			●
2. Immersion in real-world, authentic activities Intensive experience in the day-to-day work of a professional, often in a laboratory, industry, or museum, with full engagement in research activities.	○	●			
Curriculum					
3. Curriculum implementation Learning, using, and refining use of a particular set of instructional materials in the classroom.		○	○	●	
4. Curriculum replacement units Implementing a unit of instruction that addresses one topic in a way that illustrates effective teaching techniques.		○	○	●	
5. Curriculum development and adaptation Creating new instructional materials and strategies or tailoring existing ones to better meet the learning needs of students.		○	●		
Examining Practice					
6. Action Research Examining teachers' own teaching and their students' learning by engaging in a research project in the classroom.		○			●
7. Case Discussions Examining written narratives or videotapes of classroom events and discussing the problems and issues illustrated.	○	○			●
8. Examining Student Work and Thinking, and ScoringAssessments Carefully examining students' work to understand their thinking so that appropriate instructional strategies and materials can be identified.	○	○	○		●

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Purposes:
A = Developing Awareness, B = Building Knowledge,
C = Translating Into Practice, D = Practicing Teaching, E = Reflection

Strategies	A	B	C	D	E
Collaborative					
9. Study groups Engaging in regular collaborative interactions around topics identified by the group, with opportunities to examine new information, reflect on classroom practice, and analyze outcome data	○		○		●
10. Coaching and mentoring Working one-on-one with another teacher to improve teaching and learning through a variety of activities, including classroom observation and feedback, problem solving and co-planning.		○	○	●	○
11. Partnerships with experts in business, industry, and universities Working collaboratively with practicing experts with the focus on improving teacher content, knowledge, instructional materials, and access to facilities.	○	●			
12. Professional networks Linking in person or through electronic means with other teachers to explore topics of interest, pursue shared goals, and address common problems.	○	●	○		○
Vehicles and Mechanisms					
13. Workshops, institutes, courses, and seminars Using structured opportunities outside the classroom to focus intensely on topics of interest, including mathematics content, and learn from others with more expertise.	○	●	○		
14. Technology for professional development Using various kinds of technology, including computers, telecommunications, video, and CD-ROMs, to learn content and pedagogy.	○	●	○		○
15. Developing professional developers Building the skills and deep understanding of content and pedagogy needed to create learning experiences.		○	○	●	○

Professional Development

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Making the Most of Professional Development

Strategies for Successful Professional Development Implementation

The design of your professional development plan is just the first step. The next step is to implement it, and that means motivating the staff to participate. Following are several strategies that you might consider when implementing your plan.

- **Have the technology that the staff is being trained on available immediately.** Nothing will cause a program to lose its credibility quicker than teachers not having immediate access to the same technology in their classroom. Why should they spend valuable time (and get their hopes up) with training if the classrooms don't have the equipment or software? While unforeseen delays and scheduling can disrupt careful planning for coordinating hardware/software delivery and professional development, it always helps to have workable alternatives to manage a situation like this.
- **Offer incentives for participation.** The best incentive for participation in technology professional development is access to technology. That means that teachers will be given computers or other hardware and software incentives for their classrooms if they attend professional development sessions. We have seen great successes when districts tie workshop attendance to the opportunity to use technology. In effect, this makes technology a privilege rather than a right. The privilege is earned through participation in professional development and a willingness to collaborate with staff developers in future efforts. Other incentives such as stipends or recertification requirements can also help motivate people to come to training, but they do not guarantee that the attendees are really interested.
- **Require participants to engage in follow-up activities.** Teachers should not be allowed merely to attend planned activities, receive their training, and then return to their classrooms without sharing their knowledge. Rather, participants need to agree to engage in such activities as mentoring, model teaching, and/or serving as trainers in upcoming workshops. This extra effort might be rewarded through stipends, more technology rewards, release time, or salary credits.
- **Offer more than keyboard sessions.** Be sure to include sessions that are about writing and planning curriculum and other topics—not just sitting and working at a keyboard. Remember that the keyboard is intimidating to some teachers, and they will not be inclined to sit in workshop after workshop where they are performing uncomfortable and alien tasks. Rather, make your professional development sessions a combination of reinforcing what we know and learning new things. Our experience is that the non-hands-on technology workshop will be jarring at first to some teachers, as it runs counter to their expectations of what a technology workshop should be. Nevertheless, you need to take the time—non-keyboard time—to contextualize technology

use, such as learning ways of changing from teacher-focused instruction to student-focused learning (see ACOT research discussed in Chapter 3).

- **Provide time for out-of-class practice and always provide handouts.** Once again, many teachers learn best when they can practice new skills on their own, perhaps even at home on their personal computers. You cannot expect learners to master technology solely within the computer lab, and the best learning often occurs in private on the classroom computer just after class dismissal or during a planning period. To support this independent learning, be sure to provide step-by-step instructions and handouts for every new application or topic you cover. Always provide actual examples of ways in which the technology can be used within the curriculum. Even if time does not allow a thorough exploration of the examples during workshop time, make sure that every participant leaves with additional reading.
- **Use experienced trainers.** Just as good teachers serve as facilitators of knowledge development for their students, teachers themselves need good facilitators for their own development. Workshop facilitators should have a classroom background or at least have experience with teachers and the teaching environment. The appropriate trainer/facilitator will be able to communicate with teacher participants about how the technology in question is actually used in the classroom. In our experience, this contextual experience is just as important as technical knowledge. The trainer who might do an excellent job teaching insurance agents to use spreadsheets might be absolutely worthless trying to teach teachers to use spreadsheets.
- **When grouping workshop participants, make sure that the group has a common interest other than technology.** Training that takes place in one large workshop is both difficult to manage and ineffective. When you have a large group, it's a good idea to break participants into groups. Different groups will attend different sessions at different times. When grouping participants, it is important to give some thought as to how the groups are constructed. We have found that the key to successful teacher groups is that the individuals in the groups have a common purpose. When that purpose is just to learn the technology tools, we rarely find that any strong group bonding results. Identifying a common curriculum concern, curriculum subject area, or grade level will create a stronger bond. When this common purpose is established within a group of participants in a technology professional development event, the group can have a focus that transcends learning about technology.
- **Develop several professional development strands and offer them to different groups of participants.** It can be very frustrating for teachers (or anyone) to feel placed in a one-track, lock-step curriculum. Even more frustrating can be working with individuals well above or below your current technical ability. Once again, grouping everyone into the same workshop setting is seldom good for anyone. Effective professional development does not work with the least common denominator. An alternative is a professional

development series with sessions that address different needs, interests, and classes for different ability levels. This does not mean that you need to exponentially increase your total number of professional development offerings. While you may need to offer a few more sessions on basics (just to get everyone started), later sessions can be offered on a first-come, first-served basis. Everyone will eventually be able to take all courses. By allowing some choices, you create an environment where people have the opportunity to take professional development at their own schedule and pace. The primary benefit will be improved relevance to participants' own needs.

Resources

Professional Development Planning Resources

The following is a summary of the online resources for professional development planning described in this chapter.

Online Resources

http://www.nas.edu/rise/backg4a.htm
The National Academy of Science web site includes a detailed account of the *Concerns Based Adoption Model (CBAM)*, a model for understanding how the change process affects professional development.

http://www.sedl.org/pubs/catalog/items/cha22.html
SEDL offers *CBAM* information, tools, and training. Visit this site to learn more.

Professional Development

http://www.iste.org/Standards/index.html
Professional-education standards developed by the International Society for Technology in Education (ISTE) are presented on the ISTE web site.

http://www.ofps.dpi.state.nc.us/OFPS/hm/te/techcomp.htm
The North Carolina Department of Public Instruction, which is the state department of education, has developed a set of technology competencies which are featured on the department's web site.

http://lps.lexingtonma.org/Tech/Kansas/index.html
The web site for the Lexington (Massachusetts) Public Schools provides information on the required standards and skills established by the schools.

http://www.bham.wednet.edu/tcomp.htm
The Bellingham (Washington) Public Schools web site includes information on staff use of the Technology–Self-Evaluation Rubric developed by the schools.

http://www.21ct.org/sit08_pub/owa/main
Go to the 21st Century Teachers Network site for information on its mentoring program.

http://mbhs/bergtraum.k12.ny.us/mentor/
The Telementoring Web deals with using technology tools to facilitate mentoring relationships.

http://ed.gov/pubs/YesYouCan/
Yes, You Can is a guidebook for establishing mentoring programs.

http://www.lesley.edu
http://gsep.pepperdine.edu
Web sites sponsored by Lesley College and Pepperdine University include information about courses focusing on educational technology.

http://www.pt3.org
The US Department of Education's Preparing Tomorrow's Teachers to Use Technology program supports technology integration in teacher education programs.

http://ali.apple.com/nshelp/welcome.shtml
Apple Staff Development Online offers online courses and workshops on a variety of subjects.

http://thejournal.com/institute
See the web site sponsored by T.H.E. Institute for information about courses online.

http://webworkshops.com
WebWorkshops are courses and workshops focusing on integrating technology into teaching and learning.

http://www.techlearning.com
The TechLEARNING site includes threaded discussions and databases to help educators locate technology resources such as software, web sites, and conferences.

Print Resources

Hord, S.M.; Rutherford, W.L.; Huling-Austin, L.; and Hall, G. 1987. *Taking Charge of Change*. Austin, TX: Southwest Educational Development Laboratory.

Putting It All Together

A conversation about technology professional development

So, it seems that professional development is a really important part of technology integration.

Yes, it is. Since we presented several ideas in this chapter, we would like to take this opportunity to summarize some of the most important things to remember.

First, there is the need to plan. We think that professional development has a place very early on in the planning and certainly for the implementation process. The key, of course, is to create goals related to the types of technology professional development your school or district needs and then to set about acting on those goals.

The benefit to the planning team is that the planning work itself becomes a form of professional development. The planners become considerably well-versed in the substance of what they are planning and in the process itself. To ensure this type of learning, it's necessary to incorporate time for reflection, questions, clarification, and other aspects of a good learning experience. In a very general way, the technology planning experience can be a constructivist learning experience. No one comes into the process knowing all of the answers, but when planning is done well, most leave with a very clear idea of what the plan is and what it will take to implement that plan. The point is that professional development occurs almost from day one, and it's good to be aware of all of the different ways that it can (and does) occur.

When should we begin to offer professional development sessions?

This is a coordination and planning issue that depends on when the hardware and software will be available to teachers in their classrooms. It doesn't make sense to offer sessions when hardware and software availability is months away. If technology will be available at the beginning of the school year, most schools will offer professional development prior to the opening of the school year and then follow up with sessions throughout the school year.

Should the computers be in teachers' classrooms before starting professional development?

The best situation is to have computers in classrooms before teachers participate in professional development. If this isn't possible, the computers should be there *when they come back* from professional development. Remember that there is no quicker way for your professional development plan to lose credibility than to fail to make computers available to staff immediately after their training. Another problem that we see is professional development sessions that teach the use of a technology, such as the Internet, that will not be available within the school or school district for a long time. The district or school should provide appropriate

professional development based on the technology resources that are available to teachers and students.

What professional development topics are most commonly offered?
We see a lot of offerings for AppleWorks and Microsoft Office basics. It seems that most people have some basic knowledge of word processing, but there is a need for more spreadsheet training. Curiously, I don't see many offerings for the database applications in AppleWorks or Microsoft Office. After basic application training, there is a big demand for Internet training. After Internet training, the perennial favorite is PowerPoint. It is a program that can be easily learned and produces dramatic-looking results.

What would you like to see more of?
It's a mistake to say what a district *should* be doing without being in touch with information regarding their actual situation. As a basic rule, no one should try to prescribe someone else's professional development. But having said that, our experience shows that there is a continuous need for basic training workshops in applications software along with efforts that focus more on curriculum integration.

One thing I find lacking is support for those who have entry-level skills, that is, people who are totally new to using computers. Most districts do little for staff at this level. I suggest offering entry-level workshops or one-on-one support for those who need assistance of this type.

The greatest need I see is for technology professional development that addresses real needs related to teacher understanding of how technology impacts teaching and learning. In particular, teachers need to understand how technology can be a vehicle for changing from teacher-driven instruction to student-focused learning. They also need to learn and try out new ways of organizing the classroom and learning activities, such as project-based learning of the research and theory behind constuctivist learning. And they need opportunities to learn how technology can help students learn constructs mandated by state and national standards.

How many districts have a technology professional development plan?
Unfortunately, too few. Still, it's important to note that the technology professional development plan need not exist as a separate document from the overall technology plan. We think it is better to have the technology professional development plan incorporated into the district's overall professional development plan.

Of course, the problem is that many districts have absolutely nothing that even resembles a plan for general professional development, let alone technology professional development. We also find districts that commit to spending tens of thousands of dollars on professional development without taking time to see what their staff really needs.

Whether a district is introducing new technology or updating technology, professional development planning should be addressed as part of technology planning. This is where you will see that planning into practice is a recursive process that uses current practice to inform further planning.

How can we design an evaluation plan while we are so busy planning everything else? When will we ever finish planning and get to the implementation process?

Time and timeliness are a concern for all. When you do your timeline, you will see that you cannot accomplish everything at once, or even in one year. Therefore, you will need to do it in phases or stages. Create a three- or five-year time line, and show how these phases and stages will be spread across that time. It is far more prudent to go slowly and do things well than to go too fast and do things poorly. And consistently revisit what you have implemented, because you will probably be repeating the activity at a later date.

And finally, what do you think is the biggest challenge in professional development planning and implementation?

Making it appropriate, timely, and meaningful.

Chapter

5

Community Engagement

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Community Engagement

What Is Community Engagement?

Teachers and other school employees, people who live and work in your area, government agencies, and anyone else who has an interest in your school district can be considered part of your community. The members of your community may have different needs, desires, and expectations from your needs and interests. Some community members may want to become involved in any effort that improves education and may see technology as a way to bring about that improvement. On the other hand, some community members will be indifferent or will say they don't have time to be involved. In fact, they'll allow you to make the decisions because that's what you are hired to do. However, technology planners should not go about this important work without extending the opportunity for involvement to the broader community, in either the planning stage or the integration stage.

The Annenberg Institute for School Reform expands the term *community* engagement to *public* engagement. Educators, parents, and community members engage each other in "a purposeful effort, starting in either the school system or the community, to build a collaborative constituency for change and improvement in the schools." The key word in this definition is *collaboration*. Community engagement, therefore, is a reciprocal and collaborative relationship that draws in and includes members from the whole community.

Community engagement during technology planning is an essential part of building a sustainable system that benefits the entire community. Finding a way for school-based technology resources to be shared and used by the entire community is particularly critical in traditionally underserved areas where the technology available in schools may be the only technology available to the community. Therefore, if schools are to be of the greatest and broadest service to their community, the technology in schools should provide benefits to both students and community members.

Community engagement can extend to collaborations and consortia in which different organizations join together to undertake a larger cooperative effort. Often, for example, a school district and local university collaborate to provide staff development for the schools and practical experience for the university's teachers and students. The university gains by being involved directly with in-service teachers. The school district gains by receiving professional development without hiring a staff of trainers. In another school district, members of a local men's organization donate community time to help students repair computers and computer networks. In another collaborative example, several school districts across a state join with federal and state agencies to develop an educational curriculum supported by technology. By pooling resources, each of the different groups receives benefits that they could not attain alone.

The federal government provides Technology Innovation Challenge Grants (TICG) to support collaborative efforts of schools, communities, and businesses to bring technology into the community and the schools. Louisiana's Challenge Grant, *Louisiana's Challenge—Integration of Technology and Learning—A Pathway to the Future*, is an example of such a collaborative effort. Through this grant, state and district technology coordinators profit from the expertise and resources of university personnel, library staffs, local telephone and cable companies, museums, and others from the governmental and private sectors. The five school systems across the state that are involved in the Louisiana Challenge Grant have formed strong partnerships with participating groups and serve as a resource for other systems developing local technology plans. Each of the five systems, guided by a district technology committee, is developing, implementing, and evaluating a comprehensive district plan for using educational technology to raise the level of student achievement and attain educational goals.

For example, the Jefferson Elementary School of the Jefferson Parish has an array of educational technology that includes an IBM Computer Learning Center, a local area network, and a school-wide television broadcast channel, WJES, with daily student broadcasts. As a pilot site for the Greater New Orleans Free-Net, faculty and students have e-mail accounts and global electronic access to exciting places and unlimited sources of information. Jefferson hosts many business partners who help in developing the *Vision of Tomorrow's Schools*, the basis of the school-wide technology. These business partners include Shell Oil Products Company, Lockheed Martin IMS, and Kippers Communication.

Community

For some, technology planning and implementation are part of a larger initiative to improve teaching and learning. In this scenario, community and school leaders want to introduce new curriculum ideas and teaching methods and to formulate new standards for student achievement. They see technology as a catalyst for this change. For others, technology planning and implementation are part of a general school- and community-wide improvement effort. If your school is considering embarking on these broader reform initiatives or wanting to create more opportunities for dialogue across a community, we have included some contacts and materials in the *Resources* section to help you initiate these efforts.

There are many ways to involve community members in school technology planning and integration. Community members may have expertise and skills that they can contribute or they may have access to resources that you are not aware of. Perhaps you need a building to house offices for a training room, and a member of your community is willing to donate that building. Also, members in your community can be connected to other community organizations that can also benefit from technology. If a high-speed data line is going to be brought to the local school district, perhaps the library, hospital, or community organizations can also benefit. Community members joining together can bring extra funding to help support the effort at a higher level. Local parent organizations and news media can raise the level of awareness through open houses, special computer events, or fundraising activities. Some community members may be policymakers or may have contacts with policymakers at

the local, state, or national level which can be used to further initiatives that impact your planning.

Since community involvement takes on many different forms at different times in your technology planning process, you will need to be alert to opportunities as they present themselves. Assess what human, financial, and technology resources already exist in the community to support your plan. Can they be included in, and benefit from, your technology planning?

Tools in this Chapter

Community Resources Worksheet. The *Community Resources Worksheet* is designed for compiling data about potential resources in your community. Your planning committee can use it to brainstorm additions based on members' knowledge of the local scene.

Key Questions. A list of detailed questions serves as a starting point for developing your own questions regarding key community engagement issues. You will probably have many of your own questions to add.

Examples of Successful Community Programs Across the Nation. The examples can help generate ideas by showing how other schools and communities have successfully become involved with technology.

Resources. The *Resources* section provides you with a list of local potential resources and a list of national organizations that promote community technology programs. Most of these organizations have web sites that you can visit for ideas or support in your community projects.

Putting the Tools to Work

Community Resources Worksheet

Your technology planning committee can use the worksheet to identify potential community partners and resources. Be sure to include contact information on key people within each organization who are in a position to support the district's technology program.

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Appendix

Community Resources Worksheet

Type and name of organization	Potential contribution or collaboration	Contact person	Who will contact them?
Colleges/ universities	Training for teachers	Dr. Sheldon @ State U.	Tech. coor. and curr. director
Libraries/ museums	Virtual field trips	Ms. Terrell @ City library	Curr. Director
Business organizations	Build support for acquisition of resources for technology/ student interns	Mr. Wallace @ Chamber of Commerce	Supt.
Local businesses	Field trips to demonstrate business needs to teachers	Ms. Kozulski, Widgets, Inc.	Supt. and teachers
Religious organizations	Build support for new teaching practices	Rev. Nixon	Curr. Director and teachers
Community organizations	Build support for new teaching practices		
Local media	Highlight student work for community members	Ms. Nelson	
Telecommunications or technology organizations			

Planning into Practice

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Key Questions for Community Engagement

Community engagement requires careful consideration, because schools are composed of individuals with differing interests and backgrounds. Bringing a representative group together is an important first step in successful decision-making and planning for technology. Public support is essential to ensure the success and support of your technology efforts.

A number of organizations have produced resources to help educators make effective decisions related to community engagement and technology planning. Some of the following key questions come from the community engagement section of the North Central R•TEC's publication *Guiding Questions for Technology Planning*, which can be found on their web site at http://www.ncrtec.org. We believe that addressing these questions is a good place for educators to start when developing strategies to garner public support. Remember that you must look within your community to find solutions that fit your needs.

- **At what point in your technology planning do you need to have community members involved?**
  If you are beginning a large technology initiative in your district, you will definitely want public involvement early on. In fact, your school board will be key in approving the funding for such an effort. The more you encourage public ownership and understanding of the importance of what you are attempting to do, the more supportive of your efforts the public will be.
- **What kinds and levels of public support are necessary to make the implementation of your technology plan successful and sustainable?**
  The answer to this question depends on your goals. Are you going to place computers in teachers' classrooms, or are you going to create a community center in the school for technology users? Or will you go so far as to create an electronic community such a the Blacksburg Electronic Village in Blacksburg, Virginia (http://www.bev.net/)? In this community-wide effort, in a rural Appalachian county, citizens in homes, schools, public libraries, and places of work are connected to Virginia Tech with online access to training, user support, government information, social services, education, and business information. Or, do you want to target a more specific, limited community as was done in Lake Village, Arkansas, where the local hospital used the schools' computer labs to teach hospital staff basic computer skills?
- **How will you utilize parents and community members in the planning process?**
  Research has found that strong relationships and trust among participants are vital to the collaborative process. When bringing together groups of people with diverse interests and backgrounds, however, you need to have strategies and goals to maximize their participation. Do you have strategies for communicating effectively with parents and community members of linguistically, racially, and culturally diverse backgrounds? Have you considered how to arrive at a consensus with so many different value systems and points of

view? There are several other issues that you may need to keep in mind. Do the same few parents and other community members serve on all the school committees? How can you get more representation so that you have different points of view? Do community members come for the first meeting and then not attend again?

- **How will you garner support from your teachers to ensure that technology implementation and integration are successful?**
  Are teachers' opinions, concerns, and ideas recognized? Have you conducted a needs assessment or focus groups to gain their input and identify the current state of technology integration? Do teachers have an opportunity to communicate and participate in the decision-making process?
- **How will you garner support from community and business leaders for long-term partnerships?**
  Many local businesses are interested in what schools are doing because they have children who are attending the local schools. Furthermore, it is possible that their future customers or employees will come from the local schools. It is in their long-term interest to participate in your technology efforts. Assess what they can contribute and include them in your planning.
- **How will you connect and interact with museums, libraries, adult literacy programs, higher education, community-based organizations, and other community-based organizations to improve student learning?**
  These organizations have educational goals that extend beyond the classroom door. They attempt to reach the general community in less formal ways. Technology has proven to be an excellent tool to support their efforts to reach a wider and more varied audience, and they make natural partners with the schools for seeking funding or carrying out projects. Following are examples of two such projects, both located in Austin, Texas.

Community

Austin Free-Net (AFN)

Austin Free-Net (AFN) (http://www.austinfree.net/) is a nonprofit corporation providing public access to the Internet and emerging technologies for all Austin residents, especially those who don't have computers in their homes. Austin Free-Net is a community-driven project, and its services are available only in public locations. The AFN is a cooperative effort involving Austin educational, civic, and corporate entities including the University of Texas, Austin Public Library, Literacy Austin, Austin Learning Academy, Austin police and fire departments, Austin Independent School District, and other community organizations, private companies, and communications providers. Austin Free-Net focuses on addressing the needs of children and youth in low-income families. Many introductory computer and Internet classes are offered in both Spanish and English at local libraries and other community locations. AFN also teams up with local technology firms and other community organizations to deliver workforce training in technology and other technology-related service projects.

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East Austin Media Lab (EAML)

East Austin Media Lab (EAML) is a multimedia development center for disadvantaged youth. A project of Our Lady's Family Center, SER Jobs for Progress, and Austin Free-Net, EAML is one of three training labs which AFN and its partners have created for teens. It is a public access site offering high-speed (ISDN) connections to the Internet. The lab focuses on specific development tools which fit together to form a framework for community-based access and content development. You can find more details on the web at http://www.austinfree.net/EAML.

- **Are parents and community members informed regarding proposed technology integration? Do they understand its features, benefits, and drawbacks? How will their concerns be addressed?**
  It is easy to overlook the fact that some parents and community members are fearful and anxious about computer use and access to the information superhighway. How have you planned to introduce the features, benefits, and drawbacks of proposed uses of technology? Could computer technology such as e-mail, bulletin boards, or Internet access be used to improve communication between parents, schools, and other members of the community? Can you provide training and support for parents and community members so as to bring technology access and service to the wider community?

- **When thinking about your technology plan and implementation efforts, do you have both a long-term and a short-term communication plan?**
  Keeping your stakeholders, interested parties, and others aware of what you are doing requires considerable internal and external communication and public relations activities. Have you thought of ways to do this so that you can promote an effective long-term implementation of your technology plan? Do you have strategic messages for specific audiences? How will you create opportunities for school staff and the community to share information in order to foster positive relationships? How and when will you report results to internal and external stakeholders? Solicit the help of the local news media in this area. Most radio stations and television stations have public-interest air time available at no cost to educational institutions. Seek out editors who can create special features regarding your technology efforts. You should also consider some type of newsletter that is mailed directly to all your teachers and community members. If your school board already has such a vehicle in place, consider making regular contributions to that newsletter.

  We often start work with a technology planning committee by telling them that the plan they are creating is, in fact, a *public document*. This establishes the idea that one of the key purposes of the technology plan is communication. In the area of community engagement, this becomes especially important. The technology plan should effectively communicate your school's vision, goals, and intended actions for technology implementation. Naturally, then, this is something that you will want to make available to all members

of your community to garner their support. An example follows of how this was done in one community.

Carteret County School System

When the Carteret County School System (Beaufort, NC) and the county commissioners decided to offer the voters a $6.2 million local bond for technology, they developed a communication plan for the community. Using everything from public service announcements on TV and radio, to cable-TV programs, to fliers and posters, bond sponsors from the two groups worked to alert and inform the community of the benefits of the funding. As a result of the efforts to communicate with the various stakeholders, the bond was passed. Not only did it pass with a comfortable margin, but many community members continued to be involved on district planning committees, on school volunteer teams, and in publicizing successful school technology uses in the local media.

Examples of Successful Community Programs Across the Nation

Indian Creek's Electronic Bulletin Board: A Community Link

This project helped the school and community learn more about technology. It started with $18,000 of district and state funds from a Kansas State Board of Education Excellence Grant in 1993. The motive for seeking those funds was to improve K–6 students' state and national reading achievement scores by getting them to use their reading and writing skills. The bulletin-board system provided a practical reason for students to do just that. The grant allowed the purchase of bulletin-board software, a computer to use as the server, and 80 videotext terminals for students to use from home. The Community Link Bulletin Board system started operation in November 1993 with four phone lines. The current list of users includes 211 students, 153 parents and family members, 11 key pals from a Topeka retirement home, and 29 Indian Creek staff. The Indian Creek Community Link Bulletin Board has been a unique experience for an entire community. Its members have enjoyed a sense of accomplishment as they became acquainted with the technology and its functions. The bulletin board has been a safe first step for families to gain understanding of networks and experience with electronic communication. The school and its staff have earned the reputation of being technologically progressive. And the dollar cost has been minimal when compared to the benefits to entire families and a whole school. The bulletin board continues to grow and mature each year as the community learns together.

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Onaway High School Black River Design: An Experience in Technology

This is a story of how a local high school met its community's needs through its technology efforts. In return, the community supported the students' work through job opportunities.

Onaway High School's art department is unique. It includes one of the most advanced high school computer graphics labs in the state of Michigan, and it has developed in—and is now serving—a low-income, high-unemployment area of northern Michigan. OHS Black River Design has added a dimension of a student-run technology business that also provides the community's link to desktop publishing, the Internet, and the World Wide Web. The goal of the program is to expose the community, through the students, to technologies such as the Internet and desktop publishing, and to encourage the students to become local entrepreneurs, adding to the employment possibilities in the area. Through computer classes at the high school, OHS Black River Design produces a variety of products, including calendars, T-shirts, posters, business cards, signs, flyers, and web pages for local businesses. The clientele has grown enormously.

Equally significant, OHS Black River Design is not in competition with hard-pressed local businesses, as the nearest similar operation is forty-five minutes away and the program's goal is to do much of its business via the Internet. Many other OHS classes benefit from this program. The high school band, the junior high journalism course, and the high school yearbook make use of the art department's computer lab and have been helped by students in the computer graphics classes. Likewise, students in the computer graphics program are gaining skills other than computer literacy. They improve their writing skills by writing blurbs for the local newspaper. They learn about advertising by designing advertising materials for local businesses and by doing the program's own promotions. Students also learn accounting skills as they themselves do the bookkeeping and write proposals for new equipment.

Community interest in the program has been very favorable, and the community-elected board of education has been supportive. Parents have also become very excited about the program, and more of them attend open houses than ever before. There has been a great increase in parental interest in what the students are learning, and the students seem to enjoy showing their parents what they've learned.

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Net Day

One of the largest collaborative community efforts has been *Net Day*, a grassroots volunteer effort to wire K–12 schools across the US. Even though the effort varied across states and across the nation, community involvement was the core ingredient to success. On the first *Net Day*, held in October of 1996, businesspeople, telecommunications trade workers, parents, students, and educators pulled wire and punched connections to create classroom Internet access. *Net Day* has become an annual event which has enabled thousands of schools to be connected to the Internet. By bringing together these diverse elements, *Net Day* establishes a framework for lasting partnerships among the business, governmental, educational, and other local communities that provide ongoing support for our schools.

The CyberEd Tour: Taking the Internet on the Road

In the fall of 1995, President Clinton challenged corporate America to join him in an effort to bring educational technology into every classroom in America. Bert Roberts, CEO and chairman of MCI Communications, responded quickly. His offer? CyberEd! CyberEd was an eighteen-wheel, big-rig truck, a state-of-the-art, fully functional cyber classroom on wheels, providing both videoconferencing and Internet access. CyberEd's five-month, fifteen-city national tour during the spring and summer of 1996 pursued a two-fold mission: to provide hands-on Internet experiences to teachers, administrators, community leaders, parents, and students; and to serve as a catalyst for local commitment to educational technology. The CyberEd journey was fueled by a coalition of nonprofit corporate and private foundation partners, including MCI Foundation, the Milken Family Foundation, Microsoft Corporation, the William G. McGowan Charitable Fund, Corning Incorporated, and DSC Communications Corporation. TECH CORPS, a national nonprofit organization, joined the effort and served as project manager, providing logistical coordination, program content, and instructors for the truck. TECH CORPS supports K–12 schools across the country by bringing in both people and resources to enhance educational technology efforts locally. CyberEd gave TECH CORPS a valuable training tool to offer schools; TECH CORPS, meanwhile, provided CyberEd with hands-on volunteer expertise that would remain behind after the truck left. In April, Bert Roberts, Education Secretary Richard Riley, and FCC Chairman Reed Hundt joined Vice President Al Gore in front of the White House to launch the truck officially. From there, it began a 25,000-mile odyssey, criss-crossing the United States and, along the way, bringing a rich educational-technology resource to the country's Empowerment Zones, federally defined areas of our country which most need an infusion of economic resources. CyberEd needs to be replicated in communities across the country—not necessarily as an eighteen-wheeler or as a national initiative. What must be reproduced is that which brings communities together to support technology in the schools; that which empowers educators, parents, and students to learn more and to learn better; and that which gives all of us the tools to compete in the workplace of today and tomorrow.

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Mini-Libraries in Underserved Communities

In San Juan, Puerto Rico, there is a recently grown program that shows promise in a number of large cities both within and outside the US. The idea is to have mini-libraries with videos, a few computers, and Internet access to make technology much more available to poor communities. These resources—configured as a mini-library—can be placed in community centers, public housing complexes, or other areas where city services have not traditionally gone. Internationally, the government of Argentina has announced a similar program to provide access to the poor. Overall, this is an idea that is quickly taking hold in many places as a way to engage communities with technology and, in some cases, to create communities in areas where residents are very isolated.

Starting at the Beginning: Linking Early Childhood Educators

The Sharing Place is a child-care center located in the community building of Talmar Wood, a low- to middle-income housing development in Orono, Maine. It provides care for infants, toddlers, preschoolers, and school-age children. An important need is to use computer networking to exchange and manage information to help the children the center serves—and all young children—to reach their full potential. The center believes that networking can promote collaboration with adults in education and in the community to support lifelong learning. Two key events have taken place to realize these technology needs of the Sharing Place and the housing development. A listserv, Child-MEET (Maine Early Education Tele-collaborative), started in November 1996 as a first step toward creating an early-childhood education-information infrastructure in the state of Maine. Child-MEET aspires to be an online meeting place for thoughtful discussion and collaboration toward a common goal—quality early care and education for all of Maine's children. In 1996, Talmar Wood applied for and received HUD funding to create a "Neighborhood Network" technology center—the first in the state of Maine—to bring Internet access to the residents of Talmar Wood and the surrounding community. The Sharing Place will benefit from the new center, which opened across the street in August 1997. The computer learning center also provides access to senior citizens living in other low-income housing developments operated by The Housing Foundation, and new opportunities for intergenerational community building. Adult education, job-skills training, and senior and youth computer literacy programs are all in the plans for the new center. Partnerships with businesses, the University of Maine, public schools, adult-education providers, and others in the community will help the center to develop and the Talmar Wood housing development to connect with the community in new ways.

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CyberSmart!

CyberSmart! is a community-involvement project that helps parents teach their children Internet safety, especially if the school provides dial-up access. The CyberSmart! program focuses on five key topics to ensure that children's Internet experiences are safe and rewarding. Its web site (http://www.cybersmart.org) is the first to provide teachers with key resources to guide their students online. The CyberSmart! School Program was founded as a nonprofit organization in 1998 by online industry veterans and parents with the cooperation of the Somerset Hills School District, New Jersey, and the input of a preeminent group of advisors. Their vision is to provide children with the tools necessary to become safe, responsible, and powerful cybercitizens. Advisors to the program include, among others, Senator Dianne Feinstein (D: California), Congressman Bob Franks (R: New Jersey), B. Keith Fulton (National Urban League), The Somerset Hills School District, Jonathan Carson (Family Education Network), and Lori Fena (Electronic Frontier Foundation).

Resources

Community Engagement Resources

There are many local and national organizations that promote community technology projects. Check the following resources that might be in your community. While we believe, in the spirit of community engagement, that your committee should seek primary support from your own community, there may be tremendous benefits to contacting national groups. Many national programs have state and local affiliates, and may be able to tell you how to bring some of their programs into your community.

Local Organizations

The following list of local organizations was developed by NASA's Center for Technology Commercialization and is available online at http://www.ctc.org.

- Post-secondary institutions, including technical, junior, and community colleges, extension services, and/or university departments
- Fraternities and sororities or outreach programs associated with colleges and universities
- Libraries and museums
- Local business organizations such as the Chambers of Commerce, Kiwanis, Rotary, BPOE, VFW, professional women's organizations, local unions
- Major manufacturers, businesses, government agencies in or near your neighborhood, restaurants, travel agencies, data services, police
- Religious institutions and associated special interest groups
- Community-based organizations: YMCA and/or YWCA, Boys and Girls Clubs, 4-H, senior centers, credit unions, clinics, homeless shelters, community action agencies, literacy programs, cultural or ethnic clubs or associations, arts councils
- Press and media: local newspapers, local-access cable stations, magazines, circulators of advertising, billboard companies
- Local or regional free-nets or other telecommunications providers

National Organizations

http://www.ctcnet.org

The Community Technology Centers' Network (CTCNet) is a network of more than 400 community technology centers where people can gain access to computers. The sites are enormously diverse in program areas and participating populations. Some are stand-alone centers; others operate as part of a larger organization such as a multi-service agency or museum, job training center, shelter, cable public-access center, and so on. The web site provides links to some of the community

Community

centers' web sites and other related links. All centers support equitable access to computers.

http://www.100blackmen.org
The service organization 100 Black Men of America, Inc., founded in 1963, is a national alliance of leading African-American men of business, industry, public affairs, and government who devote their combined skills and resources to confronting the challenges facing African-American youth. This organization is very active in sponsoring a variety of community programs using technology, including computer clinics, the Community Computer Bus, a computer recycling program, and a youth development program.

http://www.ustc.org
TECH CORPS is a national nonprofit organization, funded through corporate contributions and implemented through state chapters. TECH CORPS's philosophy is to draw on the expertise and enthusiasm of technology-literate members of the local community. The mission of TECH CORPS is to (1) recruit, place, and support volunteers from the technology community who provide advice and assistance to schools in the introduction and integration of new technologies; (2) bring additional technology resources to schools through local and national projects; and (3) build partnerships in support of educational technology among educators, businesses, and community members at the local, state, and national levels.

http://www.til.org
Technology-in-Learning (TiL) is a computer-literacy program dedicated to providing technology-based learning activities for all members of underserved communities. Its goal is to produce positive change in the economic and social conditions that divide our society, through progressive training programs and community-building activities. Its programs and activities assist individuals and organizations in their use of technology to access information and services, while providing valuable educational experiences and employment skills to residents in the community. Technology-in-Learning collaborates with community organizations desirous of employing computer technology. In all of its projects, Technology-in-Learning focuses on the problem of computer illiteracy to facilitate stronger bonds between technology and low-income communities.

http://www.compumentor.org
CompuMentor is the largest nonprofit computer-assistance organization in the US. Since 1987, CompuMentor has utilized its consulting staff and volunteer mentors to provide training and support services and low-cost software to more than 6,000 nonprofits and schools. Recent major CompuMentor projects include *Year 2000* support for nonprofits, development of community technology centers, acquisition of donated software (CompuMentor is one of two organizations designated by Microsoft to implement its national software donation program), development of an inexpensive-hardware web resource, and various forms of

circuit riding, consulting, and mentoring, including remote mentoring and matching of mentors with low-income youth trying to enter the high-technology job market.

Other Resources

http://www.sedl.org/sedl/community.html
The Southwest Educational Development Laboratory (SEDL), a regional educational laboratory, works with members of the community at large through Collaborative Action Teams to help them identify education-related issues and plan strategies for addressing them. Using SEDL's research-based tools, members of a school community can join with members of the broader community to support positive student outcomes.

http://www.ed.gov/Technology/challenge/
Visit the Department of Education's web site for more information regarding Technology Innovation Challenge Grants from the federal government.

http://www.aisr.brown.edu
A report of the Annenberg Institute on Public Engagement for Public Education, *Reasons for hope: Voices for change* is based on an eighteen-month effort to identify, map, and describe a variety of public-engagement projects across America. It offers a look at how local, civic, business, and school initiatives across the country are developing the skills necessary to involve their communities in the work of improving public education.

http://www.nsba.org
Visit this web site sponsored by the National School Boards Association to gather more tools and resources for your community efforts.

Putting It All Together

A conversation about community engagement

Our district and region include some of the most underserved populations and areas in the country. Just how realistic is it to expect that they can support our technology efforts?

You're right, in many underserved areas across the country, the community has nothing but its schools. In these areas, the schools often have much more to offer in terms of hardware and technical expertise than does the general community. If this describes your community, you should try to seek out support that money can't buy—time, willingness to learn, and long-term commitment.

Technology can benefit an entire community because it gives focus to that community. It's surprising how many people in a community want to help their schools but do not know how to go about doing so. It's important for the school to communicate with the community, which you can do by using your technology plan as a vehicle for communication. Break down the specific tasks in ways that school outsiders can see where their efforts can be best used. In this way, the technology plan becomes a framework for community support.

So, for the most part, do you think that community support should be defined as nonphysical resources?

You can get computer hardware and software from many places across the country, but you can't get local community support from anywhere else. So, be realistic about what your community can provide. Of course, you will need funding to carry out your projects. However, a substantial amount of state and federal funding is currently available that can supplement your local funding. Less-endowed districts are frequently the first to qualify for this money. A whole-community effort is more likely to appeal to these funders. You need to keep up to date on deadlines for submitting proposals, write good proposals, and keep your technology plan updated.

One thing you haven't addressed: How can schools deal with various kinds of technology donations that may come from the community, such as older computers from businesses?

If the gifts aren't usable, they become a burden. This is not to say that all secondhand equipment is worthless. We have seen a number of schools benefit tremendously from donations of recently retired computers. But in order to make these donations work, the businesses doing the donating need to be aware of the school's existing infrastructure and support mechanisms. For example, donating machines without hard drives to a school is generally not helpful. Before you say "yes" to any of these donations, do a preliminary investigation. We are finding that some larger businesses update their computers every three years or so. In this situation, the old computers are adequate for classroom use. However, you need to find out whether you have compatible software for these

computers. If you can't use the donation, keep in mind that one facet of good community relations is knowing when and how to say "no thanks." However, you can use a direct approach to solicit donations for things you do need. First inventory your current needs, and then contact a potential donor with a "thanks for your donation" letter that describes what you need. This will help that donor in making useful and appropriate choices.

What about support from businesses that includes some commercial advertising, endorsement, or other commercial messages?

We assume you mean things such as telecommunications services or computers that are provided free to schools but also carry some sort of advertising or commercial message. Your school or school district needs to evaluate this situation, and some schools already have policies regarding the matter. Clearly, most business donations carry some sort of commercial content, even if it's just a sign or plaque that gets posted near the donated equipment. What many schools object to is continuous commercial messages such as advertising banners that are woven into the Windows desktop or messages that appear on a school web page. We think that many schools find this latter type of commercialization annoying. But on the other hand, if you want to maintain a positive, ongoing relationship with businesses, it is important to acknowledge their contributions.

Chapter

6

Managing Hardware and Software

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Managing Hardware and Software

Managing Your Infrastructure

A key piece of your technology implementation plan is the one composed of hardware—computers, printers, software, wires, cables, and connections—and software. While we have emphasized in previous chapters the importance of understanding technology in relationship to curriculum and staff development, the types of software and hardware you select will clearly impact the precise details of your staff development and, to a certain extent, just how your curriculum is supported by the technology. Therefore, making the appropriate choices here is just as important as making the right choices in other areas.

In this chapter, we offer some insight into key issues surrounding your hardware, software, networks, and connections, which make up the technology *infrastructure*. In general, the tools we offer are designed to help you think about the most important issues that you need to consider in order to make technology a useful part of your teaching and learning environment.

As you plan for infrastructure, we strongly advise you to assess the physical environment of the various facilities where you plan to add technology components. The condition of these facilities will have a major impact on your decisions. If you are building a new facility, you can design it to suit your own telecommunications, network, and computer needs. But if you have older facilities, will you need to add electrical outlets or telephone lines? Will you need to adapt heating, cooling, or ventilation systems? Or will you need to add or remove carpeting, alter acoustics, or repair a leaky roof? Do you have adequate storage and a plan to protect equipment, supplies, records, files, and such?

Before making any decisions regarding the hardware and software we describe in this chapter, you should have a reasonably well-formed notion of how you plan to use the technology you select. Have you thought about your curriculum and how technology can be used to enrich teaching and learning? How will you design your staff development so teachers can effectively learn new tools and techniques? Be cautious of planning for and spending money on technology that has little instructional use. This is a warning that we can't give too often.

Remember first to inventory your current hardware and software. You shouldn't assume that you know what already exists in your classrooms. Even though your school or district may not have widespread technology use, it is possible that some teachers or principals have already taken the initiative to obtain computer technology through grants, donations, or other funding sources. As a result, you may find a variety of existing hardware and software across your school or district. Most importantly, don't ignore the expertise of those teachers

who are already using computers in their classrooms. Find out what they are using, how they are using it, and how well it is working for them. This is valuable knowledge you can use in planning.

Be sure to consider how you will provide ongoing support for your infrastructure after the hardware or software has been installed. One detail that schools often overlook is including the cost of diskettes, printer cartridges, and printer paper in their annual supplies budget. One of our schools forgot to allow for the purchase of these items and was scrambling around at the last minute reallocating funds.

Finally, technology systems and software will become outdated, and equipment will wear out. While you don't need to keep up with every single technological innovation, your technology planning process should also include provisions for regular assessment and updating of your infrastructure.

Tools in this Chapter

We have included several resources in this chapter to help you plan and manage your infrastructure.

Computer Configurations for Educators. The configuration information presents some of the possible ways to organize or configure computers within your school. You will find ideas, costs, and pros and cons for computer labs, classrooms, media centers, and combination configurations.

Making the Most of a One- or Few-Computer Classroom. The material suggests scenarios for using and managing the one- or few-computer classroom. While it is beneficial to place computers in the classroom, many schools begin technology implementation with only one or two computers for each classroom. In this scenario, teachers are faced with new classroom-management issues. We have observed that teachers who are not able to overcome these issues simply don't use the computers at all. Or worse yet, they allow students to use computers for electronic recess. We hope this section provides you with some ideas and strategies for maximizing computer use in a classroom with a limited number of computers.

Choosing Educational Software. The guidelines address such issues as basic software packages every teacher should have and questions to consider when choosing content-specific applications.

Evaluation Practices. A step-by-step guide to evaluating software for your school or district is included to help in your decision-making process.

Software Selection Framework. The rubric is designed to assist you in converting your conceptual framework for educational software into a practical selection tool. You can share this rubric with colleagues and refer to it as you begin to preview various software packages.

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Educational Software Evaluation Form. You can use the template to record your observations while previewing and reviewing educational software.

Creating a Base for Support. The information on support will give you some practical ideas on how to create a base of support from which to manage hardware and software throughout future months and years.

Hardware and Software Resources. The section includes lists of educational software publishers, titles, evaluation sites, and online distributors, as well as online resources for student technology support.

Selecting Hardware

Computer Configurations for Educators

When selecting computers, printers, and associated equipment, you will be faced with an additional set of questions: How many computers do we need? How will the computers be arranged in the classroom? How much computing power is necessary? Are multimedia stations necessary? Again, consider the educational use of the computers to guide your decisions. We have seen the following configurations used successfully.

Computer Lab

Although this is perhaps the most common arrangement found in schools today, the trend is towards more computers in classrooms rather than in labs. The lab arrangement allows for centralization and convenient administration of hardware resources and the ability for a large number of students to use a particular software program simultaneously. A computer-lab teacher remains in the lab while groups of students rotate through the room.

The computer-lab configuration supports an instructor-led teaching strategy with group learning. While it may be appropriate for some basic skills training, this arrangement tends to limit the time that the individual student can spend using technology. A problem with the lab configuration is that it flies in the face of the recently increased emphasis on *integration* of technology into the curriculum; it separates technology from the classroom where learning usually takes place. Furthermore, many technology uses within the curriculum are not well-suited for large group work. Labs sometimes don't allow the classroom teacher to provide individual attention to students while they use technology. Instead, the lab teacher is expected to provide that support. The focal point of the student experience in a lab setting tends to be the technology itself, rather than collaborative interaction with the teacher or other students.

However, labs do provide a valuable resource that supplements classroom-based computers. Teachers can use labs for those subjects where a large group is appropriate (e.g., writing laboratories or integrated learning systems). They may also use classroom computers for experiences such as technology-facilitated

cooperative learning experiences, student and teacher presentations, or Internet access and research. In addition, many schools open their labs to individual student use before and after school.

Single Classroom Computer with Large-Screen TV

The single classroom computer with large-screen TV is the next most common configuration. A single multimedia workstation might be attached to a large TV with a device known as a *scan converter*. The scan converter is a simple and relatively inexpensive device—between $100 and $200—that converts the output from a computer (Macintosh or PC) to a signal that can be displayed on the television screen. A suitable large-screen TV would be one measuring at least 29 inches diagonally. Smaller TVs are sometimes used, but these cannot be adequately seen from a distance. When not being used to display computer output, the TV can serve traditional classroom purposes, such as use with a VCR or cable television. Following are some web sites for researching scan converters:

- AVerMedia Technologies: http://www.aver.com/aver/
- Focus Enhancements: http://www.focusinfo.com/
- Zenith Electronics: http://www.zenith.com/index_flash.html

One factor to consider when employing the single-computer arrangement is the physical placement of the classroom computer. The computer should be placed close to the TV monitor (assuming that the TV is fixed in a permanent position, such as at the front of the class on the wall), and it should be easily accessible to students. The ideal situation is to have both the computer and the TV movable, so that the teacher can position the equipment differently according to different and changing classroom layouts. This configuration can support teacher-led or student-led demonstrations or presentations. When the TV is turned off, the computer functions as a workstation for individual or group work.

Presentation devices such as video projectors or LCD panels are sometimes used in classrooms, but they can be very expensive. Since they are projection devices, they require a large blank wall or screen. They are more commonly used for large group presentations in large rooms. Following are some web sites for researching presentation devices:

- Proxima Corporation: http://www.prxm.com/
- Sharp Electronics: http://www.sharp-usa.com/
- Infocus: http://store.infocus.com

Multiple Computers Per Classroom

The key factor in adopting this configuration may be access to electrical power supply, especially for older buildings. A desirable arrangement would be one computer attached to a scan converter and large-screen TV and one or more additional computers distributed around the classroom. These additional computers need not be attached to a scan converter. Ideally, the additional computers will be placed in different locations around the room (not all lined up against

one wall). The optimum arrangement is for all of the computers in the classroom to be networked in order to share a common printer. Network connections beyond the immediate classroom are highly desirable as well (see the following information on Networks).

Shared Computer on a Cart with Large-Screen TV

When it is not possible to have at least one computer per classroom, many schools make one or more computers available to teachers on a sign-up basis. These shared computers are placed on large rolling carts and are moved from room to room on an as-needed/as-available basis. If a large-screen TV is not available in each classroom, the rolling cart may include a TV with scan converter as well. In this way, an entire multimedia system is made available to each teacher.

Some schools have school-wide network connections in each classroom, even though there may not be computers in each classroom. In this case, the rolling computer can be plugged into the network from the room where it currently resides. When the machine moves, it is unplugged from the network and plugged back in at its new location.

Aside from the computer (and perhaps TV and scan converter), the rolling cart might include other devices such as a printer, scanner, or laserdisc player.

Large-Screen TV on a Cart

Sometimes it is the large-screen TV that is more rare than the classroom computer. Perhaps all classrooms have computers, but there are only a few TVs with scan converters available in a building. In these cases, schools place the TV and scan converter on a cart and move it around to different classrooms when teachers want to display output from their classroom computer for an entire class (or large group) to view.

Portable Computers on a Cart

Some schools have found an alternative to purchasing several expensive computers for each classroom. This configuration utilizes a simple portable computer about the size of a keyboard. Several of these computers are kept on a cart and shared among teachers. Or, one teacher could have several of these in the classroom. To supplement the portable computers, a classroom might have only one or two multimedia computers. AlphaSmart at http://www.alphasmart.com/ is one of the well-known commercial brands for this type of computer. These computers cost much less than a regular workstation—$200-$300 per unit versus $1,000 per workstation.

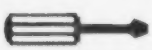
Computers in the Library/Media Center

Most school library/media centers have one or more computers available for student use within that facility. Often, these computers are attached (directly or via modem) to the Internet, as well as to the school's online library catalog. Computers in the library/media center are invaluable tools for student research and are also often used before and after school by students desiring extra time on a computer. Nevertheless, we don't recommend placing all of your computers in the library.

The library is not a suitable place to send groups of students to do computer work, as they tend to disturb those students using the library's nontechnology resources. This creates an access problem that can result in most students having little access to technology. If a school has only a few computers, it would be well-advised to try the computers-on-carts arrangement.

Networks

Local Area Networks (LANs) allow the sharing of resources among the machines located in a given school, classroom, or lab. These resources might include printers, CD-ROM towers, and other data storage devices on which reside shared programs and software. Wide Area Networks (WANs) connect LANs to resources located outside of the school. A prime example of a WAN resource is the Internet or, more specifically, the World Wide Web. WAN connections can be full-time (using leased data lines/circuits) or part-time (using modems and dial-up connections to resources such as the Internet). You should consult with network professionals to determine how, and whether, you want to create a network. They can best advise you on cost and support issues.



Making the Most of a One- or Few-Computer Classroom

How well teachers are able to make use of the single computer in the classroom has much to do with their instructional strategies and how they organize to teach the curriculum. As is often noted, integration of technology requires teachers to *rethink* how they teach.

In the one-computer classroom, the teacher often sets up a schedule by which students take turns using the computer, or each student may have a special weekly time on the computer. This is a kind of pullout model in which the student on the computer is excused from the work the rest of the class is doing. In setting up a schedule, teachers may give consideration to students' academic strengths. For example, if Nancy is especially strong in math, math time would be a good time to schedule her Internet time. Other teachers may choose to set up a computer station through which students rotate one at a time, using a posted list.

With practice, most teachers find that the benefits of technology integration—such as increased student motivation, improved interaction with content, and development of cooperative learning skills, just to name a few—are worth the time it takes to modify existing curriculum activities.

A single computer can be used effectively in the classroom as a presentation tool, a tool for the generation or production of student work, a cooperative learning tool, and an in-class information resource. While many teachers are very familiar with how the computer can be used to present audio-visual information to an entire class (see the following information on Display Issues), other uses may require a bit more investigation.

Computer Placement and Portability

Where is the best place to locate a classroom computer? If it is on the teacher's desk, how easy will it be for students to access it? If it is securely fastened to a table in the back of the classroom, then how could it be used to display something (e.g., images from a CD-ROM) to the entire class? What if it is necessary to borrow a computer from the teacher next door in order to have two computers available for a particular activity? Clearly, computer placement and portability have a practical impact on how teachers are able to use computers in their classrooms.

In most schools, portability and security are equally important, yet sometimes competing, issues. Computers that are not permanently affixed to tables or desks often disappear during nights, weekends, and holidays. On the other hand, locked-down computers often result in computers that cannot be used in a wide variety of ways. The solution that many schools have found is to affix classroom computers to small media carts. The same sort of device that can lock a computer to a table can also lock it to a media cart. This cart can be moved around the room (or into the room next door, up the hall, etc.) where needed. If you have a network in your school, remember to get a long cable so that the computer cart can be located fairly close to the network jack. The same thing goes for a phone cable if you are using a modem on your classroom computer.

Since a media cart is not altogether immobile, it is important to have a way to lock down the cart to an immobile object such as the building wall. We have seen some schools do this with a bicycle chain and a large eyelet affixed to the wall. Some particularly security-conscious schools require that the media carts be wheeled into a lockable closet or very secure room in the evenings (and especially during school vacations). A media cart that is just big enough for the computer, monitor, and maybe a small printer costs only $100 to $200, which is well worth the added flexibility it brings.

Display Issues

It doesn't take much to realize that thirty children cannot easily view a single nine-inch computer monitor. So, how is it possible to turn that little display into something a whole class can see? Teachers address this issue by using various devices to take the video output from the computer and either project it or display it on their classroom TVs. In the chart that follows, we summarize the features of some of the more common display devices and give the pros and cons of each.

Selecting a Display Device

Device	Advantages	Disadvantages
Existing computer monitor	• No additional cost • No additional set-up time/skills required	• Too small for more than a few people to view at once • Unless you have a notebook computer, the monitor is probably not portable.
Video Projector	• Single device, no overhead required • Can be used in virtually normal room light • Very clear and sharp image • Easy to set up • Very portable • Will work with Macintosh, PC, laser disc player, VCR • Most also have speakers for sound	• Costly
Scan Converter	• Single device, no overhead required • Connects to any existing TV • Very cost-effective	• Image not as clear as video projector (especially with the inexpensive ones) • Not all are cross-platform (i.e., may need one for Macintoshes and another for PCs).

Our recommendation for educators with limited funds? Go with the scan converter. The video projector is technically the best choice, but until the cost comes down on these units, it is unlikely that your school could afford to buy even one, much less two or three to circulate around the school. The LCD panel is a good concept, but in practice it is worthless in most schools. They are fragile and difficult to set up, and most classrooms cannot be made dark enough to allow anyone to see the projected image. If you have the money to buy an LCD panel, you ought to spend it on a video projector instead.

The scan converter is inexpensive and works with all of those big TVs (nineteen-inch or larger) you already have. You do not need to buy a new or special TV. If the TV works with a VCR (i.e., you can plug the VCR into the TV and the picture is good enough for a class or large group to view), it will work with the scan converter. You can buy several converters and schedule their use along

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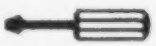
with the TVs. True, the image quality is not up to monitor or video-projector standards, but the combination accomplishes the primary task of allowing an entire class to see the output of a single computer.

Selecting Software

Choosing Educational Software



Before purchasing new computers for your school, ask the vendors what software is included on the machines. When an individual buys a personal computer, software applications are commonly preinstalled. This is not generally the case for computers sold to schools. Therefore, software purchases must be included in your technology planning. Many schools purchase computers but don't properly plan to purchase the software tools necessary to make those computers useful.

In the course of our work with schools and districts around the country, we are often asked to recommend the one or two best software packages for teaching particular subjects. Our usual responses are unfortunately *not* what many teachers want to hear. When confronted with the best-software question, we respond by asking what software they are currently using and what they want to accomplish with the software. The responses are quite interesting, because it is common for the questioner to report that they haven't used any *educational* software. The only software that they might have is a word processor or spreadsheet application. What the questioner is really asking is what curriculum-specific software can be used to teach a particular subject.

There are many excellent educational software packages that can serve as valuable curriculum resources in the hands of creative and innovative teachers. All too often, teachers seem to be looking for the technologic equivalent of the magic bullet; that is, the piece of software that will make learning come alive and solve a host of educational problems. Sometimes this magic bullet is thought to be the World Wide Web or an integrated learning system that can raise standardized test scores and have students reading well beyond grade level.

As we discussed in Chapter 3 on integration, what does make a difference is teacher skill in using technology tools intelligently within the context of the curriculum. And when it comes to software tools, a teacher's skill is manifest in his or her ability to select the appropriate tool for the particular student learning style and task. Often, the appropriate tool is a basic application such as a word processor or spreadsheet. Other times, a communications tool such as e-mail or the World Wide Web might be in order. Yet again, learning might best occur through the use of a technology-based simulation. Finally, when there is a need for basic-skills development or reinforcement, a technology-based tutorial tool might be an excellent choice. All of this needs to be balanced with the fact that sometimes good old paper-and-pencil technology works as well as a computer for a particular task.

So, what basic software do we recommend for classroom computers? What software do teachers across the country most frequently use in their classrooms? The following summarizes our observations and conclusions.

Word Processor

The word processing applications in either AppleWorks or Microsoft Office are the most popular among educators. Microsoft Works features another word processing application that is popular with teachers. Beware of word processors that are unique, because they might not allow you to transfer or share files with other word processors.

Spreadsheet

The Microsoft Excel application that is included with most versions of Microsoft Office and the spreadsheet functions within AppleWorks and Microsoft Works are the most popular spreadsheets used by educators. In this case, most teachers find that simple programs work best for them.

CD-ROM Encyclopedias

Microsoft Encarta, Grolier's, and Compton's are the most common electronic encyclopedias.

Presentation Manager

Microsoft PowerPoint is especially popular, and it comes with most versions of Microsoft Office. The slide-show function in AppleWorks is similar to PowerPoint. Hyperstudio is a popular multimedia software application that incorporates sound and graphics.

Web Browser

Netscape Navigator and Microsoft Explorer are the most popular browsers available. You need an Internet connection on your classroom computer to use this software.

E-mail

There are several e-mail software applications in use. Many people use the e-mail program that comes with the web browser on their computer. However, you must be connected to the Internet through a modem or through the school's network to access e-mail.

Beyond the Basics

Most teachers would add to the preceding list of basic software a number of content-specific programs. Included in this type of software would be those programs that focus on simulations, drill and practice, critical thinking, and cooperative learning (see the Chapter 3 tool *Integrating Technology into the Curriculum* for examples of titles). The software application that you choose has everything to do with content area, grade level, instructional strategy, and a whole host of teaching and learning issues. To make informed decisions regarding selection of other software applications, you first need to answer the following questions:

- What software do you currently have? Be sure to remember and consider basic applications software that might have been bundled with your computers when they were purchased.

- How are you using your existing software (either basic applications or subject-area-specific packages)? Have you received training in the use of that software?
- What are your curriculum objectives? Have you thought about the ways that software or technology in general might improve your work with students? How might you explore those ideas without just going out and buying technology largely sight unseen?
- Are you working with other teachers—such as a grade or subject-area team—to develop software recommendations and units/lessons within which that software will be used?

When you can answer these kinds of questions, *then* you are in a position to begin to evaluate educational software packages. The focus of the questions places software evaluation and selection into a contextual framework that helps define the notion of best within a particular educational environment. As with all tools and practices, *best* is a relative term.

Evaluation Practices

Once you have a conceptual framework for selecting software, there are a number of things you can do to actually begin previewing applications.

Accumulate information on available packages. To help you gather information to evaluate software, we have provided a *Software Selection Framework* and an *Educational Software Evaluation Form* that you can reproduce and use when reviewing potentially useful applications. Software catalogs, educational technology conferences, and the web sites listed later in this chapter are starting points for this.

Preview software at a preview center. It can be quite expensive to buy and try new software. You should first try to locate a software preview center. Your regional education center or local college or university might have a facility where you can try out several packages and compare them side by side. Most software preview centers will not allow you to check out or borrow materials, but all have facilities to enable you to experiment with software on the center's own equipment.

Arrange to use software on a trial basis. When you have identified software from catalogs, online directories, or preview center visits, you need to arrange for trial use of packages that seem interesting. By trial use, we mean that you should arrange to have the software sent to your school for a thirty-day (or longer) period to use before you purchase the software. This is a common procedure. All educational software publishers expect that teachers will want to preview their software before committing to purchase. Some publishers will agree to send you trial software based solely on a phone call. Others will require that you send a purchase order which will not be charged unless you decide to purchase, or fail to return, the software by the end of the agreed-upon trial period. In most cases,

you will need to pay return shipping for any software you decline to purchase and instead return. While this is an expense, it is much less than spending hundreds of dollars on software that turns out to be unsuited to your needs.

Record your observations about the software you try. When evaluating software, you will want to use tools such as the *Educational Software Evaluation Form* found later in this chapter to record and keep track of your observations. We also strongly recommend that you work with another educator or team of educators to share impressions of the software that you are reviewing. If at all possible, try the software out with students. You need to see if you will be able to use the software in its real-life context to know if it is something that will really benefit your students.

Thoroughly review the licensing parameters. Once you are sure that the software is pedagogically sound—that is, that it fits your current curriculum and student needs—make sure that it can be advantageously licensed. This means that the manufacturer should price the software so that you are encouraged to purchase a sufficient number of *legal* copies to fit your needs. Many software publishers are sensitive to the particular circumstances found in schools, such as multiple workstations, the need to share licenses, and machines located both in labs and classrooms.

Check compatibility with existing hardware. Verify that the desired software will run on your existing hardware. The majority of current educational software is sold on hybrid disks that will run on either a Macintosh or PC platform. However, you need to check to make sure that you order the proper type or that the software will run on either system. Also, if you have older machines, do they have the capacity to run the new software? Do they have the capability for accepting new software that is now almost exclusively on CD-ROM? In general, verify that your machines are fast enough, have sufficient disk space, have CD-ROM drives, and have appropriate multimedia devices (speakers, graphics monitors, etc.) to run new software.

Find out about support. Make sure that the package you choose has a complete manual and reliable technical support, whether paid or free. Many times, the educational versions of certain packages contain teachers' manuals and guides that are not sold with the home or commercial versions.

Maximize your purchasing power. Before purchasing your software, find out what buying power your district already has. Some states have a list of approved software that can be purchased at a considerable discount.

Share with others in your school and district. Find time to share advocacy for the software you locate, use, and enjoy. This will help raise the overall awareness of instructional technology.

Software Selection Framework

Complete the following framework for software that you want to find. The framework is not intended to describe a particular software package. Rather, you should use it to take note of the desired attributes of the software you are seeking. It's a good idea to share the framework with your colleagues to get their feedback and comments before you begin to preview software; a reproducible version of the form is included in the Appendix. For more information on ways of using software in the curriculum, see the discussion of integration in Chapter 3.

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Appendix

Software Selection Framework

Desired subject area (e.g., mathematics, language arts, social studies, etc.)
Social Studies-Civics and Government

Targeted grades
Grades 9-12

Intended use (What curriculum objectives will it serve? When during the year will it be used? How many students will use it?)
Package should help students understand the processes involved in creating a government and establishing the rule of law. To be integrated into the first unit of US History (after the Revolution) as a kick off activity. Whole class should use (separately? simultaneously?).

Type of software (i.e., tutorial, communications)
Some sort of simulation would be good.

Teachers/departments using the software
Every US history teacher should try this and consider for adoption.

Special student considerations (primary language, special needs, etc.)
English. Software must not overly emphasize computer skills in order to use. Must be very user friendly and primarily driven by rich content.

Infrastructure considerations (hardware platform, network requirements, multimedia, special support, etc.)
Must be able to run on the single Mac in each history teacher's classroom.

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Planning into Practice

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Educational Software Evaluation Form

Once you have decided on the instructional needs for a piece of software, you will need to evaluate some specific applications. The following form can help you organize the information gathered during that process. A reproducible copy of the form is included in the Appendix.

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SEIR•TEC Appendix

Educational Software Evaluation (page 1 of 2)

Evaluator: Andy Carroll
Date Published: ?
Today's Date: 5/25/99
Age/Grade Range: 7-12
Software Title: Decisions, Decisions 5.0- Building a Nation
Platform: Mac or Win95
Cost: $380
Network Version? No, but available
Publisher: Tom Snyder
System Requirements: CD-ROM drive, sound card
Subject Area(s): Social Studies etc.

1. What is the overall purpose or use of this software application?
To help students understand the processes involved in developing government and establishing the rule of law in a new society

2. How would you best classify the use of this software?
a. Tutorial (including drill and practice)
b. (Exploration)
c. Application or productivity tool
d. Reference
e. Entertainment
f. Other

3. Does the content appear educationally sound and well-researched, e.g., does it mesh with national standards and curriculum frameworks, is the information current and free of bias and stereotype?
Very sound. Unusual product in that it focuses on post-colonial Africa. Good use of cultural diversity in this subject area (govt.) Good interface. Definitely req. some practice and review first. Read the manual? Good manuals.

4. Is the program sufficiently easy to maneuver through, e.g., does it allow you to save your work at any point, can you easily return to a main menu or orienting point, are the graphics and icons clear?)
Use either to introduce U.S. History at the Revolution unit or as culminating activity to this unit. Also could be used in Lesotho's African History course!

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Appendix SERI•TEC

Educational Software Evaluation (page 2 of 2)

5. Describe how you envision your students using this software, e.g., would they be working alone or in cooperative groups, in the classroom, laboratory, or library, as part of regular classroom work or as an add-on, reward?

Requires full class. Not a stand-alone software package. Built on coop lrn./problem-solving model. Ideal for use on single classroom computer!!

6. What do you most like about this software?

Great simulation. Unique subject focus (post-colonial Africa) on this curriculum area (basic US govt./civics). Love the coop learning model. Great that it can be done with just one computer!!

7. What do you like least?

Kind of expensive for a package that just focuses on one curriculum area. Really does require teacher to interact with the students while this activity is taking place.

8. What are your impressions of the supporting documentation, e.g., installation and troubleshooting instructions, teacher's guide, lesson plans, extension activities?

Terrific teachers' guide! Manual looks pretty good. Nice graphics.

9. Does the cost of the software seem appropriate? Is there enough flexibility to allow students to use the program multiple times, can the difficulty level grow with the student, are you paying a premium for fancy graphics that don't necessarily impact the learning experience?

A little expensive, but cheaper than comparable laserdisc products. I think it's worth getting for the 45-day preview to try it with actual students this fall. If it works, then it's probably not too expensive.

10. Does the publisher offer technical and educational support for its products? How accessible is this support, how quickly do they respond, are they sensitive to the needs of teachers using the program in a classroom setting?

There's an 800 number for tech support. This publisher is at all of the ed tech conferences, so they seem reputable. Good reputation! Many of these packages are on the state bid list. Try and see?

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Keeping It Together

Creating a Base for Support

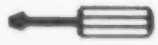
Keeping everything running smoothly will require some type of coordinated support plan that is adequately funded and staffed. As more and more people begin using computers, more and more demands will be made for support.

Most schools report that one key strategy in addressing the support issue is to have an on-site support person taking care of the everyday problems within a school. There is nothing more frustrating for a teacher than to have to wait several days or weeks for a district support person to arrive. On the other hand, it is a waste of resources to send a district support person out to a school to fix a jammed printer or, worse, to find that a student already fixed the problem.

Some districts are selecting and training capable students to become Techno-Pals who can help teachers and students with small problems. Some teachers are adding hardware and software troubleshooting courses to the curriculum. Another strategy is to use community volunteers who can devote a few hours per week.

Certainly, students cannot be the only source of technology maintenance and support. In a similar vein, many districts are trying to develop classroom teachers' skills so that they can take care of all but the most time-consuming technical-support issues. This can be effective—and we discuss some of these efforts in Chapter 4—but the fact remains that dedicated technical support is still required at some level. In short, we highly recommend that your district engage professional technology support either on a full-time or a contract basis. One way or another, you *will* need this support. Each district will have to assess its resources to determine what kind of hardware and software support they will be able to provide and how they will be able to manage.

Hardware and Software Resources



Educational Software

Educational software companies provide web sites with much to offer teachers. You can download software for preview, add your name to the mailing list to receive catalogs and new-product announcements, purchase products online, and get technical support. Many educational software companies also offer worthwhile curriculum resources. Not all educational software publishers have previews available for download from their web sites. On the other hand, most publishers have free CD-ROM-based previews that they are happy to send you via regular mail. See their web sites for details. Following are some of the larger educational publishers and major software titles.

Educational Software Publishers

http://www.broderbund.com
Broderbund Software

http://www.donjohnston.com
Don Johnston, Inc.

http://www.edmark.com
EdMark

http://www.foresttech.com/index.html
Forest Technologies

http://www.knowledgeadventure.com
Knowledge Adventure

http://www.tlc.com
The Learning Company

http://www.microsoft.com
Microsoft

http://www.mindscape.com
Mindscape

http://www.scholastic.com/
Scholastic

http://www.simcity.com/index.shtml
SimCity

http://www.sunburst.com
Sunburst

http://www.teachtsp.com
Tom Snyder Productions

Software Titles

Title	Publisher	World Wide Web Address
Appleworks	Apple Computer	www.apple.com/appleworks.shtml
Decisions, Decisions	Tom Snyder Productions	www.teachtsp.com
Encarta	Microsoft	www.microsoft.com/Encarta
EnviroNet	Simmons College	http://earth.simmons.edu
Excel	Microsoft	www.microsoft.com/excel/default.htm
Grammar Games	Knowledge Adventure	www.knowledgeadventure.com
Great Ocean Rescue	Tom Snyder Productions	www.teachtsp.com
Grolier's Multimedia Encyclopedia	Grolier	www.gigrolier.com
HyperStudio	Roger Wagner Publishing	www.hyperstudio.com
Journey North	Annenberg/CPB	www.learner.org/jnorth
KidPix Studio Deluxe	Broderbund Publishing	www.broderbund.com
MathBlaster	Knowledge Adventure	www.knowledgeadventure.com
Microsoft Office	Microsoft	www.microsoft.com/office
Oregon Trail	The Learning Company	www.tlc.com
PowerPoint	Microsoft	www.microsoft.com/powerpoint/default.htm
Rainforest Researchers	Tom Snyder Productions	www.teachtsp.com
SimCity	Maxis	www.simcity.com/home.shtml
Sim Earth	Maxis	www.simcity.com/home.shtml
Spell It Deluxe	Knowledge Adventure	www.knowledgeadventure.com
TimeLiner	Tom Snyder Productions	www.teachtsp.com

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Software Evaluation Sites/Clearinghouses

http://clearinghouse.k12.ca.us/
California Instructional Technology Clearinghouse

http://www.enc.org
Eisenhower National Clearinghouse

http://www.evalutech.sreb.org/
EvaluTech

http://www.siia.net
Software and Information Industry Association

Online Software Distributors

http://www.edresources.com/
Educational Resources

http://www.edsoft.com/q/index.html
Educational Software Institute

http://www.queueinc.com/queueinc/product.html
Queue, Inc.

Student Technology-Support Resources

http://www.kde.state.ky.us/oet/customer/stlp/default.asp
The Kentucky Student Technology Leadership program is a very successful program for developing student leaders in the area of technology support. The Kentucky Department of Education organizes training and support for these students at the district and regional levels, and students work in their own schools to support their teachers and fellow students.

http://genwhy.wednet.edu/
Generation www.Y (WorldWide Horizons for Youth) is a national project that helps students in grades 6-12 become technology leaders, supporters, and mentors within their schools. Originally funded as a US Department of Education Technology Innovation Challenge Grant, Generation www.Y has partner schools across the country and serves as a very replicable model.

Putting It All Together

A conversation about technology infrastructure

Let's get right to the point. How can a school district best address its problems related to too few computers and too many students?
That's a concern for a m.jority of schools across the nation. The schools we primarily work with are traditionally underserved populations who struggle with the issue of resources every day. Support from the federal government through such programs as the E-Rate (available through the Universal Service Fund) and Technology Literacy Challenge Grants are making significant headway in terms of getting more technology into schools. Nevertheless, there is still a tremendous way to go before children and teachers in many of our states have equitable access to tools.

Gaining access to technology is an issue that is being addressed by most schools; however, we are also finding more and more that schools and teachers who already have access to technology are not fully utilizing what they have. We feel that this problem can be remedied by implementing better staff-development sessions, promoting more teacher collaboration, providing more release time, and giving recognition for use of technology, not by buying *more* technology.

Here is a story that illustrates my point. A number of years ago, a friend bought his father a simple computer to use for word processing. Dad was retired and he wanted to write his memoirs. My friend figured that the computer might be a good way to get his dad to both exercise his creativity and learn a new skill. Well, after about a month, when my friend asked him how it was going, his dad said that using the computer was okay, but that he really didn't see any advantage to it over his old manual typewriter. He went on to say that the computer was actually lots more work and if it was okay with his son, his response was: "thanks, but no thanks." Finally, he added that the biggest problem with the computer was the huge number of files (and disks) that resulted from this one writing project. This really piqued my friend's interest, and he asked his Dad how many files he had. Dad said "Oh, I don't know . . . a couple hundred." It turns out that my friend's dad was starting a *new* disk file for every page of his book! His frame of reference was the typewriter, and he therefore assumed that when you typed to the bottom of the page you needed to start a new sheet of paper. On the computer, he did this by starting a new file. Two hundred pages equal two hundred files!

What can we learn from Dad? What I learned is that you can't simply apply new technology to old paradigms. You can use a computer as a typewriter, but when you do this without modifying your underlying understanding of the process, you actually manage to make your life much harder than before the innovation.

Teachers who assume that instructional-technology tools must be used in a one-student-one-computer model haven't modified their paradigm to make best

use of the innovation. For the vast majority of learning activities, it is quite unnecessary to have one computer per student. This doesn't mean that it's wrong to have more than one computer per classroom. On the other hand, we often see teachers who assume that technology has not been integrated if every student doesn't touch the computer at least once at some point in the unit or lesson. Technology is a tool that can assist the processes of teaching and learning and can be introduced in many ways and at many different points during a unit.

So, when we hear that a school has a shortage of technology, we first ask exactly what that means. And then we try to find out whether the teachers in that school have explored the technology thoroughly and whether they have received appropriate staff development to facilitate that exploration. It is a mistake to assume automatically that teachers need more technology.

What basic infrastructure is required for teaching?

I think that each classroom should have at least one Internet-ready, networked, multimedia workstation with a suite of basic software. This configuration should be connected to a printer either directly or via the local area network. Also very important is that the classroom workstation be configured so that its output can be displayed either by projection or on a large television screen. This latter method—the large TV screen—is definitely preferable from the standpoint of cost, and we find it to work quite well in terms of visibility.

After a school has acquired the basics, what peripherals can you recommend?

In terms of hardware, I've found that equipment for digital imaging is gaining popularity in schools. By this, I mean scanners, digital cameras, and video input devices. The price on decent-quality digital cameras is still a bit high, but scanners have come down to the point where a perfectly good scanner can be had for under $200. Many school computers (particularly Macintoshes) already have the hardware to accept video input. The newer multimedia PCs frequently have these features.

What trends do you see?

First, the price of basic workstations is falling as smaller, more portable, and less expensive units are being made available. The hardware industry has finally realized they can sell lots of less expensive, moderately powered machines instead of continually developing faster and more powerful machines. I think that we may be starting to reach a plateau in terms of *marketable* computer power, at least for certain markets, as manufacturers begin to focus more on price than on increased performance and to search out broader markets. As a result, schools will benefit by being able to buy more computers. However, the software industry seems to be a bit behind the hardware industry. Each year they introduce new software versions that need more power and memory, which contributes to an escalating need for more powerful machines.

I see the second major trend in technology infrastructure as related to the Internet and, specifically, to bandwidth. Basically, I believe that the next several

years will see a continuing growth in speed and reliability of network access. As they become more common, cable television-based and wireless service will drive up user expectations related to speed and bandwidth. As access improves, more and more people will think of the Internet (or more accurately, the World Wide Web) as their primary technology tool.

We think that in the future educators will be able to get more hardware for their money, but where they will need to spend *more* money is in improving network access—getting more bandwidth. Fortunately for needy school districts, the E-Rate made available through the Universal Service Fund will provide financial assistance in this area.

Chapter

7

Evaluation

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Evaluation

How Do We Know It's Working?

As we look at schools in the SEIR•TEC region, as well as around the country, we find that increasingly parents, board members, teachers, and the general public are asking "How do we know it's working?" Is educational technology providing the benefit and impacts at the classroom level that live up to the promise it holds in so many people's minds? Everywhere we go, the logic is the same. Districts have spent millions on technology infrastructure, materials, and professional development, but all too often, these investments have been made without any clearly framed way of assessing the impact that technology has on student achievement.

There are some who will say that information technology is simply another educational fad, and that, just as so many things before it, technology will end up gathering dust while schools continue to grapple with the real business of teaching and learning. Ultimately, schools will stop spending money on computers and start buying something else. Well, if history can be a predictor, the pundits might just be correct. But this does not have to be the case. If educators can establish clear goals for technology's use as a tool for teaching and learning, and measure the performance towards meeting those goals, technology will not be funded solely on faith. The challenge is to create realistic evaluations of instructional technology's impact on students and their academic achievements.

In Chapter 1, we shared some of the lessons we have learned from working with the SEIR•TEC intensive site schools over the past few years. Perhaps the most significant insight we have gained is that when we see improvements in student achievement, it is the result of a combination of factors, not merely the availability of technology. These factors include, but are not limited to: the vision and support of school and district leaders; the usefulness of the technology plan; teachers' attitudes, beliefs, and behaviors; the amount, availability, and quality of professional development and technical assistance; the teaching and learning environment; and the extent to which technology use is linked to the curriculum, standards, and student assessment.

Another important observation is that evaluation is usually the weakest component of technology plans. Not surprisingly, technology leaders at the US Department of Education say that evaluation is often the weakest part of grant proposals, too. We don't know exactly why this happens, but we think there are several factors involved:

- There are not many school and district-level professionals who have the expertise in both evaluation and instructional technology needed to design and implement high-quality evaluations. This seems to be particularly true in

rural districts where there are no universities with graduate programs in technology and evaluation.

- Traditional measures of student learning, such as standardized tests, seldom measure the benefits students gain through the use of technology, such as critical thinking, cooperation, research skills, independent learning, product design, and task commitment.
- Policymakers and funding agencies often have unrealistic expectations about the improvements in learning that will result from technology initiatives. One legislature in our region, for example, wanted to see gains in student achievement-test scores six months after funding was appropriated. When you consider that it takes an average of four to five years for most teachers to reach the state of technology proficiency where they use computers fluidly and effectively, and that an impact on students will not occur any sooner, it's no wonder that administrators can be more concerned about potential political fallout from a negative evaluation than in learning how to improve their programs.

On the other hand, we have seen stellar examples of how technology leaders have used evaluation data and progress reports to garner increased support from policymakers and the community at large. When school boards have data indicating that the money that has been spent for the technology program is leading to improvements in teaching and learning, they are usually willing to allocate more money. In other words, success begets success. We have also observed that schools and districts that monitor their progress toward technology integration see evaluation results as input into planning their technology program, e.g., identifying needs, problems, and opportunities. The point is that evaluation is neither easy nor inexpensive, but when it is an integral part of the ongoing technology planning and infusion process, it is well worth the effort.

THE Tools Tools in this Chapter

Some Important Terms. A list of evaluation-related terms and definitions is included to ensure that everyone in the evaluation process is using the same terms in the same ways.

Evaluation Committee Composition Matrix. The matrix is designed to enable you to select members for your evaluation committee who will be effective in carrying out the evaluation process.

Technology Evaluation Organizing Questions. The list of questions serves as a starting point for the evaluation process.

Developing Indicators Worksheet. The worksheet helps evaluators organize information that will be useful in developing performance indicators.

Online Teacher Technology Survey. We have reproduced an online survey that can be used to gather teacher input for the technology program evaluation process.

Classroom Observation Template. The form can be used by administrators or other teachers who are observing classroom use of technology as part of the evaluation process.

Sample Teacher Focus Group Questions. Conducting focus groups of teachers who are using technology to teach can be a valuable part of the technology program evaluation process. An extensive list of *Sample Teacher Focus Group Questions* is included to help you conduct your own focus groups.

Using the Evaluation Results. *Using the Evaluation Results* suggests the most productive uses of the results of your technology program evaluation.

Evaluation Resources. A list of online and print resources is included at the end of the chapter.

Putting the Tools to Work

Some Important Terms

When we conduct workshops on evaluation, we sometimes notice that not everyone uses the same terms in the same ways. We thought this would be a good place to stop and talk about some important evaluation terms and concepts—just to be sure everyone is on the same wavelength.

Assessment and Evaluation

In general parlance, *assessment* and *evaluation* are often used interchangeably. In this chapter, however, each term has a specific meaning. When we talk about *assessment*, we're referring to the measurement of knowledge, skills, and performance—usually in terms of learning. For example, we talk about the assessment of student learning in terms of portfolios of their work or scores on end-of-grade tests. We might also refer to self-assessment measures that teachers can use as a tool to reflect on their technology competencies. When we talk about *evaluation*, we mean ways of examining the performance of the overall technology program as well as specific aspects of the program, such as professional development, technical assistance, and resources. Program evaluation usually addresses questions of accountability, quality, impact, sustainability, and lessons learned:

- **Accountability.** Is the program doing what it is supposed to do, i.e., what was laid out in the technology plan? Is the money being well-spent?
- **Quality.** How well are we implementing program activities and strategies? How good (useful, effective, well-received) are the program's services and products, such as professional development, technical assistance, resources, and infrastructure?
- **Impact.** Is the program making a difference? What effects are services and products having on teachers? students? administrators? the school climate? the community?
- **Sustainability.** What elements are, or need to be, in place for sustained levels of improvement in teaching and learning with technology to occur?
- **Lessons learned.** What lessons are we learning about the processes and factors that support or inhibit the accomplishment of objectives?

Answers to these questions should lead to an understanding of the extent to which the program is meeting its goals and objectives.

Proximal and Distal Effects

Evaluators sometimes use the terms *proximal* (near) and *distal* (distant) to talk about the relative strength of effects or outcomes. Let's say, for example, that a district wants to evaluate the impact of a series of workshops on ways to use

technology to enhance writing. (See the following chart.) The *proximal* effects of the workshops would be that teachers learn new skills and acquire new knowledge about how to use technology effectively as they help students learn to write. Typically this kind of effect is measured by a questionnaire administered at the end of each workshop. That's fine, because you need to know how well the workshops went, but wouldn't it be much more important to find out whether teachers are actually applying what they learned in the workshops (the *intermediate effect*)? Until you determine whether teachers are using technology as intended, you cannot say for certain that any changes in students' writing are the result (*distal* effect) of the teachers' professional development. If you look at proximal, intermediate, and distal effects, you should be able to identify breakdowns in the system as well as unexpected benefits. Then you can use the information to decide whether to continue or revise program activities.

Strategy	Proximal Effects	Intermediate Effects	Distal Effects
Teachers participate in workshops on using technology to support students' writing.	Teachers learn new skills and acquire new knowledge.	Teachers apply new knowledge and skills as they teach. Students use technology for learning.	Student performance improves.

Formative and Summative Evaluation

Let's say your district is conducting a series of six workshops on integrating technology into the curriculum. At the end of each day, or at the end of each workshop, participants complete a questionnaire where they indicate their level of satisfaction with the workshop content, format, presenter, materials, and so forth. The workshop leaders review the questionnaires and use the data to make decisions about which aspects of the workshop they should retain, revise, or eliminate in delivering subsequent workshops. This is *formative evaluation*, or taking a look at what is or isn't working and making adjustments while the activities are still fluid. After the final workshop, the workshop leaders compile the data and review the results of the questionnaires from all the workshops in order to make decisions about the value of the entire initiative. This is *summative evaluation*. Many people think that summative evaluation is what happens at the end of each year, but it is important to realize that it the nature and duration of the activity, not the calendar, that should determine when summative evaluation occurs. The point is that your evaluation component should include both formative and summative strategies.

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Quantitative and Qualitative Data

Evaluation is a data-driven process. The basic evaluative process is to collect and analyze data that will help you make decisions about which elements of your program are working and which need to be improved. Evaluation also helps schools and districts tell their story (Bingham, 1999) in order to garner support from the community. The framework—or plot—of this story is determined by the evaluation questions created, but the story itself comes from data. Therefore, in educational-technology evaluation, the evaluator's task is to gather data that tell the stories of how technology has impacted teaching and learning. Data can be *quantitative* (counts of things) or *qualitative* (narration of things). We tend to think of quantitative data as coming from surveys, questionnaires, and standardized tests. Qualitative data usually come from interviews, classroom observations, focus groups, and archival documents, such as minutes of meetings and newspaper articles. A well-rounded evaluation will make use of both types of data by including broad-based indicators that are measured using quantitative and qualitative data (Sun, 2000). It is no more possible to tell the story of technology's impact solely through reporting test scores and computer counts than it is by simply laying out a string of anecdotal stories. Rather, data should be deeply descriptive and logically supportive of the questions to which it responds.

Key Elements of a Technology Program Evaluation Plan

There are several good evaluation models that you can adopt or adapt for your technology program. If you've had a graduate course in the subject, you might go back through your textbooks to look at some of the classic models developed by experts in the field, such as Robert E. Stake, Daniel Stufflebeam, or W. James Popham. Or, you could search the ERIC database, which you can access through www.serve.org/disc, to find technology plans that include comprehensive evaluation components.

For the SEIR•TEC project, we use a model that was originally developed at Western Michigan University by Brinkerhoff, Brethower, Hluchyj, and Nowakoski (1983). While the complete model would probably be overkill for most district technology plans (the SEIR•TEC evaluation plan is about an inch thick), there are key elements that can serve as a framework for any program. These elements are evaluation questions, indicators of success, information sources, and criteria and benchmarks. The following chart is an excerpt from a district technology evaluation plan that is based on this model.

Objective: Help teachers and administrators acquire the knowledge and develop the skills necessary for effective technology integration by providing ongoing professional development			
Evaluation Questions	**Indicators of Success**	**Information Sources**	**Criteria and Benchmarks**
How effective are professional development services?	Teachers and administrators consider the district's professional development services to be effective, useful, and worthwhile. Teachers effectively use technology in teaching and for professional productivity. Administrators support, promote, and effectively use technology for teaching and learning.	Questionnaires Classroom observations Self-assessments based on ISTE standards	All teachers and administrators demonstrate mastery of ISTE standards. Teachers are satisfied with administrators' support for technology integration. Technology is infused into the majority of the schools' courses.
What lessons have been learned from professional development?	Promising practices and materials for professional development are identified, documented, and disseminated. Barriers and solutions to professional development are described in terms useful to program planners.	Formative and summative questionnaires for each professional development event Formal and informal interviews with teacher teams and mentors Journals	The technology committee is in agreement about the positive and negative aspects of the lessons learned.

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Evaluation Questions

As a rule of thumb, we suggest that there be at least one evaluation question per program objective. And, depending on the nature of the objective, you might want to ask different kinds of questions to get at accountability, quality, impact, sustainability, and lessons learned. You probably do not need to ask questions about each of these for every objective, however.

Indicators of Success

Indicators provide the contexts for each question and describe the desired conditions against which success is measured. Typically, indicators focus our attention on issues of quality, effectiveness, efficacy, usefulness, client satisfaction, and impact. Using the above example, indicators of success might be: professional development services are meeting the needs of target audiences; teachers and administrators consider the district's professional development services to be effective, useful, and worthwhile; educators are effectively using technology in their teaching; or barriers and solutions to professional development are described in terms useful to other projects and programs. For more information, check out The National Study of School Evaluation's compendium of quality indicators for technology programs in K–12 schools (see the *Resources* list at the end of this chapter).

Information Sources

Information sources are methods or strategies for collecting data related to evaluation questions. Recognizing the importance of understanding not only the *who, what,* and *when* of your work, but also the *why* and *how,* we suggest that your evaluation plan encompass a variety of quantitative and qualitative methods, such as surveys, questionnaires, interviews, and observations. For example, if you want to know whether teachers are applying what they learned through professional development, you might learn more from going into classrooms and observing what teachers do, what students do, and the general classroom environment, rather than (or in addition to) conducting a survey.

You might also consider less traditional ways of collecting data. Focus groups and advisory committees can be very effective ways of finding out how the program is perceived across the district and the community. Archives, such as minutes of meetings and newspaper articles, are fairly easy ways of documenting events. They might tell you much about quality or effectiveness—and they do give evidence of accountability.

Criteria and Benchmarks

As you collect and analyze evaluation data about the various components of your technology program, you'll want a way of determining just how well things are going and how much progress has been made. Criteria and benchmarks will help you do this.

Earlier in the chapter, we talked about criteria for making decisions about the effectiveness of a workshop or judging the impact of technology on student

achievement. You can also develop criteria and benchmarks for instruments that use Likkert-type scales or rubrics, e.g., the CEO Forum STaR chart or the SEIR•TEC Progress Gauge. As you implement these instruments over time—at the beginning and again at the end of the school year—you'll be looking for movement forward, i.e., moving from 1s to 2s or from 2s to 3s on rubrics. In determining just how much movement is desirable or required, it would be helpful to have criteria or benchmarks. There are no set rules about how strong the criteria or how rigid the benchmarks should be; just keep in mind that they need to be realistic, and they need to support the integrity of the evaluation. If you have 40 sets of rubrics, on how many could you realistically and reliably expect to see improvement? Half? 30? This would be a good topic for discussion for the planning committee.

As we saw in the evaluation plan sample earlier in the chapter, you can use criteria and benchmarks that involve notions of consensus or majority. For example, if your district is providing professional development designed to help teachers create technology-enhanced lesson plans, it is not unrealistic to expect that all of the teachers will implement the lessons and/or develop additional lessons. It would also be perfectly reasonable to have a criterion saying something like, "After reviewing the results of the workshop questionnaires, all members of the technology committee agree that the professional development program is meeting teachers' needs."

As our colleague Margaret Bingham says, "You need to stick a stake in the ground and say 'Today we are here.' Then later, you can stick another stake in the ground and say 'Now we are here.' The distance between the stakes shows you how much progress has been made."

An Evaluation Process

Evaluating technology initiatives is an ongoing process that involves eight basic steps:

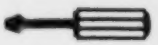
- Create an evaluation committee.
- Identify evaluation priorities and develop related evaluation questions.
- Create performance indicators for each evaluation question.
- Identify or develop data collection methods and instruments.
- Collect data.
- Study the results.
- Create an evaluation report on the results of the evaluation, findings, lessons learned, and directions for future efforts.
- Use the evaluation results to update your technology plan.

Committee Composition

A district-wide evaluation committee is the organizing structure of the technology evaluations we have facilitated in most districts. As an initial step, districts create a technology evaluation committee composed of stakeholders from throughout the district and local community. This committee closely parallels the structure of the district's technology *planning* committee in that in order for the committee to be effective, it must be representative of the interests and concerns of the broad district community. It is also important that the committee *not* be composed entirely of individuals who are considered the technology power users in the district. Remember, the evaluation is designed to answer basic questions about technology's impact on teaching and learning. Therefore, experience in teaching and learning is considerably more important than being well-versed in technology itself. In general, the committees we work with number about 12 to 15 members and include district-level staff, a board member, and principals, as well as classroom teachers and technology specialists from all grade levels.

Evaluation Committee Composition Matrix

A worksheet similar to the following can be useful in assigning and delineating committee membership. A reproducible copy of the worksheet may be found in the Appendix.



Appendix

Evaluation Committee Composition Matrix

To create and conduct your technology evaluation, you need a committee composed of educational stakeholders *who will actively work* to help create the evaluation. Remember:

- You will need committee members who represent *all* aspects of your school community. This means teachers (from a variety of grades and/or subject areas), administrators, parents, community members (e.g., businesspeople), and perhaps students.
- Do not load your committee with figureheads who are not willing to actually work on the plan.
- The evaluation process contains many different tasks. You need writers, curriculum people, infrastructure people, people who are good with budgets, and policy people.
- The commitment to be a part of the technology-evaluation committee is not a short-term commitment. A formative evaluation by definition is ongoing and iterative. The committee members should be willing to assist in your school's technology-evaluation efforts long after the data are collected and reports are written.

	Teachers	Administrators	Parents	Others
Curriculum				
Professional Development				
Infrastructure				
Process Tasks (editing, calling meetings, etc.)				

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Technology Evaluation Organizing Questions

Once assembled, the evaluation committee should meet for the first time to review its task and to receive a general introduction to the district's goals and objectives for instructional technology. At this meeting, it is also useful for the committee members to receive an orientation to the technology evaluation process and to begin the work of identifying evaluation questions and indicators

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SEIR•TEC Appendix

Technology Evaluation Organizing Questions

When thinking about program evaluation, it is useful to consider some organizing questions. Working in groups, please answer the following questions. Be prepared to report out your answers at the conclusion of the group work.

1. This evaluation will evaluate various aspects of how well technology has been integrated in your schools and district. What does *integration* mean to you? Provide some examples.

2. All programs must have a driving purpose. What is the best reason your district has implemented and integrated technology as a part of its teaching and learning environment?

3. Evaluation is about measuring change. When evaluating how well your schools and district have integrated technology, what sort of changes do you expect to see as a result of this integration?

   Changes related to teachers?

   Changes related to students?

   Other changes?

4. Change produces results. Evaluation measures those results against expectations. Identify three aspects of technology integration that can be measured in order to evaluate the change that has occurred in your schools and district as a result of technology integration.

   a.

   b.

   c.

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of achievement that are specific to those questions.

Before you begin working on the evaluation plan, you might find it useful for the committee to consider a set of organizing questions. These are summarized in the following worksheet. A reproducible copy is provided in the Appendix.

Questions and Indicators

Most often, we have found that a committee may base evaluation questions on the goals and objectives laid out in the technology plan. This method of developing questions rooted in planning goals addresses the district's basic need to know if it is meeting goals for instructional technology and the various implementation process steps. The process is also likely to yield information that can be used for a strategic-plan update.

Example Questions

The following are some sample evaluation questions developed by districts with which we have worked:

- To what extent are our teachers utilizing technology to increase the depth of student understanding and learning engagement?
- How have students been impacted by technology integration? Has technology improved student achievement, had no impact, or perhaps negatively impacted achievement?
- Are our teachers using technology in ways that match both our district goals for technology use and the potential that exists for technology as an instructional aid?
- Have we adequately allocated district technology resources so that students and teachers can realize the resources' potential?
- How effective has our professional development model been in helping teachers attain basic technology proficiency?
- How effective have basic technology skills been in helping teachers do things that they could not have done otherwise?

Developing Indicators

After developing evaluation questions, the committee's work should turn toward creating performance indicators for each question. This work is often accomplished by dividing the full committee into subcommittees—one for each evaluation question. Each subcommittee can then work to develop indicators. Ultimately, the subcommittees will use the indicators to identify sources of information (data collection methods and instruments) and criteria for making decisions, such as rubrics. Each subcommittee will review the work of each of the other two subcommittees. The product of this review is subsequently fed back into each group's development process. In this way every committee member is

able to review each of the questions/indicators/methods/criteria, and this review benefits the work of the whole committee.

Developing Indicators Worksheet

The following worksheet can help subcommittees develop their indicators. The categories we have used on the worksheet represent the most common types of evaluation questions. A reproducible copy may be found in the Appendix.

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Appendix

Developing Indicators Worksheet

Working with a small group of stakeholders, identify 3 (or more) indicators for each of the following categories.

An indicator is a simple statement of *what you would expect to find or see* that demonstrates a particular attribute. For example, one indicator of the season known as summer might be: "Warm temperatures inspire people to wear lighter clothing." Inversely, if we see people wearing light clothing, one possible conclusion (applying our indicator) is that the season is summer.

Effective Use of Technology

1. _____
2. _____
3. _____

Technology's Impact on Students

1. _____
2. _____
3. _____

Technology's Impact on Teachers

1. _____
2. _____
3. _____

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Planning into Practice

Information Sources

A variety of tools and techniques can provide useful information for your evaluation, including surveys, observations, interviews, focus groups, reviews of teacher/student work, and public meetings. The point is to collect data that are directly related to the evaluation questions and indicators.

For example, if an indicator of high achievement in teacher use of technology is that teachers will use e-mail to communicate with peers outside the district, then data should show the number as well as substance of teacher e-mail communications. This might include technical logs (e.g., how often do teachers access their e-mail accounts); teacher surveys to determine how often e-mail is used and for what; and teacher interviews to determine the value placed upon e-mail communication.

It is worth mentioning that while data collection might take place at the individual level of performance, individual data should never be reported. The mission of a district-wide evaluation is to determine the progress of the district *as a group of individuals* in meeting its goals and objectives. Nothing will undermine an evaluation project faster than the perception that it is measuring or ranking individuals. If individual assessments are important, these should be developed and administered separately from your district technology evaluation.

There are a variety of tools useful for data collection. The following pages contain a variety of sample data collection tools such as:

- *Online Teacher Technology Survey*
- *Classroom Observation Template*
- *Sample Teacher Focus Group Questions*

Other good sources of evaluation tools and instruments are available from the High Plains & North Central Regional Technology in Education Consortia: www.hprtec.org or www.ncrtec.org

Online Teacher Technology Survey

Note—an online version of this survey, as well as a link to a site with code for producing your own online survey, can be found at www.sun-associates.com/eval/sample.

Teacher Technology Survey

The following brief survey is part of our effort to evaluate the effectiveness of instructional technology and its implementation across the district.

Choose a school ⇕ Choose your school's name.

Each teacher has been assigned a *unique* identification number for completing this survey. You *should not* use someone else's identification number. Survey responses with duplicate numbers will be considered invalid.

How has technology impacted your students' achievement?

Please check all of the following statements with which you agree.

Technology increases my students' motivation	☐
My students use technology to acquire basic skills	☐
My students use technology to become more critical thinkers	☐
My students use technology to help them construct new knowledge	☐
My students use technology to solve relevant, real-life, problems	☐
My students use technology to discover concepts and prove relationships	☐
My students use technology to communicate knowledge and information	☐

Please check all of the technologies which you employ **with your students.**

Word Processors	☐
Integrated Learning System (e.g., Jostens, Writing to Read, etc.)	☐
Spreadsheets	☐
Tutorial and basic skills development programs	☐
Special Applications for Reading, Math, etc. (e.g., Accelerated Reader)	☐
E-mail	☐
World Wide Web/Internet	☐
Presentation Software (e.g., PowerPoint)	☐
Hyperstudio	☐
CD-ROM Encyclopedias	☐
Graphing Calculators	☐
Probes for data acquisition (temperature, mass, etc.)	☐

My students use technology *primarily* in singular ⇕ settings. Choose one.

The following questions deal with **your own** use of technology.

Please check all of the statements with which you agree.

I use technology applications such as word processors and spreadsheets to produce materials for use with my students	☐
I use online (WWW) resources to find materials relevant to my curriculum	☐
I use presentation software and hardware within my classroom	☐
I use e-mail to contact peers and experts both inside and outside of the district	☐
I use e-mail to communicate with parents and students	☐
I use technology to maintain student records (e.g., electronic grade book, etc.)	☐
I use technology to monitor student performance (e.g., electronic portfolios)	☐
I believe that I can recognize the ethical use of technology	☐
I model the ethical use of technology with my students	☐
My building technology coordinator has helped me implement the district technology standards	☐
My building technology coordinator has assisted me in finding ways to integrate technology within my curriculum	☐
District-level technology resource teachers have assisted me in implementing standards and integrating technology	☐

I use a variety of teaching strategies that incorporate technology use (choose one):

several times a day ▲▼

The learning activities I develop (choose one) seldom ▲▼ require students to use technology.

Please estimate the percentage of your written communication (to all individuals in the course of your professional work) that takes place electronically 100% ▲▼

Evaluation

Finally, we are interested in your opinion on the following:

The technology plan for my school is frequently monitored

Yes (●)
No ( )

The administrator in my school is involved in technology professional development

Yes ( )
No (●)

If you have additional comments you would like to add, you can use the following area to enter them.

When you are finished with this survey, click on this button to [Submit] the survey for processing.

If you want to delete all of your answers and start again, click here [Reset]

Survey Form Updated 9/9/99

Evaluation

Classroom Observation Template

In the effort to find out what is happening in classrooms, direct observations can be revealing. A template such as this one may be used by administrators or by other teachers to observe classroom use of technology. A reproducible copy of this template may be found in the Appendix.

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SEIR•TEC Appendix

Classroom Observation Template

School *West Side High*	
Teacher *Ms. Burns*	**Grade/Subject** *Latin*
Class Size (est.) *25*	
Observer *Ms. Dimock*	**Date**

Teaching—Learning Methods (e.g., direct instruction, project-based learning) *Project-based learning, cooperative groups*
Brief Description of Classroom Activity/Lesson *The students are preparing for a trial of Julius Caesar. They are writing briefs and rehearsing as witnesses.*
Student Groupings (single, small, large, etc.) and Interactions *Some students are working in small groups while others are working alone.*
Technology (hardware and software) and/or Instructional Materials In Use *Students are using a variety of resources including the textbook, electronic encyclopedia, and the Internet to find information that will help them prepare for the trial.*
Number of Computers in this Classroom *four computers*
Other Notes *I need to ask Ms. Burns if I can come back when the trial happens—I wonder who she has in mind for the judge.*

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Sample Teacher Focus Group Questions

You may find the following sample questions helpful in conducting your own focus groups of teachers.

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Sample Teacher Focus Group Questions (page 1 of 5)

Student Access and Use Questions

1. Describe how your students typically use lab or classroom computers.
   writing, drawing, reading, presenting
   e-mail/communication
   skill reinforcement
   programs related to curriculum (simulations, topical adventures)
   research (CD-ROM, Internet, other)

2. What kind of software is available for student use in the classroom or lab?
   word processors
   graphics packages
   databases, spreadsheets
   simulations
   e-mail
   reference (CD-ROMs, dictionaries)
   Internet, World Wide Web
   science probes
   drill & practice
   electronic books
   presentation tools (timeline maker, multimedia-maker)

3. How do students typically use the computers...and why? (i.e., probe for the reasons why they favor a particular pattern of use...e.g., "You can't do anything with one computer; each student needs to work individually;" class management issues; etc.)
   individually
   in pairs or small groups
   as a whole class

4. Could you give me an estimate of the percentage of students who have access to a computer at home?

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SEIR•TEC Appendix

Sample Teacher Focus Group Questions (page 2 of 5)

5. We're interested in your impressions of how the information technology you have just described has impacted your students' learning. Overall, how have students been impacted by the use of technology in your school? (probe for examples, evidence)
   Special or specific assessments?
   Nothing in addition to nontechnology-specific assessments.
   Other?
   Most students are more motivated, more engaged, and better cooperative learners
   Computers are a more effective reward for completing work
   Some students are more distracted

6. How do you evaluate your students in terms of their technology use?

7. What does technology allow your students to do now—either physically or intellectually—that would have been impossible (or at least more difficult) before technology was widely available in your school? (allow for the fact that they may not think that technology is *currently* widely available)

8. What changes could be made to technology in your school that would allow *your students* to benefit more from technology?
   more hardware
   placement of computers in the classrooms instead of labs
   more software titles
   additional technical support
   policies

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Sample Teacher Focus Group Questions (page 3 of 5)

Teacher Fluency Questions

9. Please describe how you *most frequently* make use of school computers. We don't want to know all of what you do...just what you most often do. (probe for uses directly related to instruction, administrative uses/record keeping, personal productivity, etc.)

10. OK, that's what you most frequently do. Now tell us some of the other things...regardless of how often you might do them.

11. If not on your desk or in your classroom, where do you use computers most often?
teacher's lounge
home
school computer lab
library/media center

12. Do you have access to a computer at home? (yes or no answer)

13. How accessible are the classroom or lab computers to teachers throughout the day?
available all day
available only during off-hours
available with sign-up

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SEIR•TEC Appendix

Sample Teacher Focus Group Questions (page 4 of 5)

14. What, if any, impact has the use of information technology had on your teaching? (probe for the following list without reading it)
   - more efficient
   - easier record keeping
   - more collaboration with peers/ reduced isolation
   - more fun teaching
   - changed role from expert to facilitator
   - more creative/ adventuresome with curriculum
   - more individualized instruction
   - access to better resources
   - more
   - better parent contact

15. In what ways has your professional practice (i.e., teaching) improved through the use of technology? (designed to be pretty open-ended. Allow for the fact that the improvement may have been mostly negative)

16. What barriers have you encountered in trying to use technology in the classroom?
   - too little time to learn
   - inadequate professional development
   - periods too short
   - finding software
   - Other _____

Teacher Vision/Strategy Questions

17. How do you get your ideas for integrating technology in the classroom?

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Sample Teacher Focus Group Questions (page 5 of 5)

18. What is the most interesting or intriguing use of technology in education that you have ever heard about? It doesn't matter to us whether you can actually DO this yet...we just want to know what you find interesting.

Teacher Access and Professional Development Questions

19. What changes would you like to see made in your school with regard to how technology is allocated or structured? (note that they may comment on both physical infrastructure as well as support issues)

20. How often is technology staff development offered at your school and/or in the district...and who is responsible for conducting this training?

21. What barriers have you encountered in terms of getting the technology training you want and/or need?

22. What has been the most useful use technology workshop you have attended, and why?

23. Is there anything else you would like to share with us?

Thank You for Your Time!!

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Using the Evaluation Results

What are you going to do with the evaluation results? Typically, evaluation results are summarized in end-of-year or end-of-project reports that help technology leaders determine how successful the district has been in meeting program goals and objectives. Specifically, the data should help them make data-informed decisions about whether to continue, terminate, refocus, or modify activities and strategies included in the technology plan.

While reports are useful, think how much more impact a PowerPoint presentation or school portfolio would be when you're trying to convince the school board to increase funding for technology. In addition to telling stories and presenting data, you could include products of learning and other kinds of evidence that make the program more real to those who have not been actively involved.

The Link Between Technology and Student Achievement

When considering the findings from an evaluation of a technology integration initiative, it is reasonable to ask if there isn't another bottom line issue; that is, what is the connection—if any—between student and teacher technology use and traditional student assessments such as standardized test scores? Given the amount of attention provided to traditional assessments, it is certainly expected that one should attempt to tie all important educational initiatives, such as technology, to performance gains or losses on these scores.

We believe that there is a link between technology and student performance as measured by traditional assessments; but this link is not direct. In other words, technology alone is not responsible for increases in student achievement. Rather, improvements in learning result from a *combination* of factors, including the way the teacher teaches, ready access to technology, administrative support, and the classroom environment. More and more, we are realizing that another crucial factor is the linkage among technology use, the curriculum, standards, and assessments.

Educational research tells us that student achievement increases when learning activities are engaging and student-centered. Learning needs to be standards based, relevant, attuned to the individual student's style of learning, and holistic—that is, tied to a student's prior knowledge, experience, and interests. Another way of saying all of this is to shorthand these descriptions and state that high-performing student learning is engaged and constructivist in nature and guided by strong and meaningful curriculum frameworks. Students who are able to work in environments that encourage this type of learning *will* achieve. While existing standardized tests do at best only an adequate job of measuring student achievement and knowledge, students who are engaged in supportive learning environments and reformed teaching practices will generally score higher than students who are not.

It all comes back to the same basic point, that technology is only a useful—and in this case, we can say, impactful—tool when used in the hands of a skilled teacher. The issue is pedagogy, not computer skills. Schools where teachers are

employing student-focused instructional practices, where administrators support and expect such practices, where students are actively and excitedly involved in the process of learning—these will be high-performing schools. The role of evaluation is to provide a systematic way of examining the systems, structures, and practices that support good teaching with technology, and ultimately, the practices that promote effective learning.

Resources

Evaluation Resources

Online Resources

www.hprtec.org
Profiler–a collection of on-line tools & instruments for collecting and analyzing data that can be helpful for planning evaluation.

http://www.apple.com/education/k12/leadership/acot/library.html
Changing the Conversation about Teaching, Learning & Technology—A Report on 10 Years of ACOT Research. 1996. Apple Computer Corporation.

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Putting It All Together

A conversation about evaluating technology programs

What do you think about external evaluators for technology projects?
There is a growing trend toward involving evaluation experts outside the district in designing and implementing the evaluation plan. The US Department of Education, in particular, tends to favor grant proposals that include external evaluators instead of relying solely on internal expertise. The thinking is that someone from outside the system can provide a more objective point of view than those who are immersed in the situation. An external evaluator can also provide additional expertise in evaluation design and methods. The down side of having an external evaluator is that it can be expensive. If you're writing a grant proposal where the whole evaluation will be conducted externally, you should set aside about ten percent of the budget for that purpose. An alternative might be to have someone from outside the district help design the evaluation component of the technology plan, but have educators within the district collect and analyze the data. The external evaluator could review the results from time to time to make sure you're on track.

Evaluation can be somewhat intimidating, especially if you're worried that the results might be used to reduce the district's level of commitment to technology integration. What tips would you offer that might ease teachers and administrators' worries?
The main thing is to think positively. If you're conducting formative evaluation as you implement the technology plan, and you make adjustments in activities and strategies according to the results, it's difficult to imagine that the overall evaluation will turn out badly. Even if you do have some negative findings, there will be plenty of things to be happy about. And, no matter what, you will undoubtedly learn a few valuable lessons about what works, what doesn't work, and the factors that affect success.

Another tip is to brag on your successes. If you focus on negative findings from the evaluation, you can just bet that everyone else will, too. But if you focus on the positive, while being objective about the negative, you'll build support for technology integration in your district.

What should we do if test scores don't go up?
As we said before, improvements in learning result from a combination of factors, including the way teachers teach, access to technology, the classroom environment, and administrative support. Another big factor is the extent to which technology use supports the curriculum and assessments measure what's included in the curriculum. If test scores don't improve as you (and the school board) hope, you might start by taking a look at these factors. Are teachers using technology in meaningful ways? Are they using it to support traditional instruction, or are students engaged in constructivist learning? How easy or difficult is it for teachers

and students to access technology? Do administrators support teachers by finding ways for them to participate in professional development, finding funding for technology, and providing an environment conducive to experimentation? Take a good look at the curriculum and state standards. Have teachers developed or adopted technology-enhanced lessons that help students master the concepts and skills covered in the curriculum and standards? Do the assessments measure what students have learned?

Don't forget that traditional methods of assessment seldom measure the things that technology supports best, such as critical thinking, problem solving, creativity, design, productivity, and communication. We have found that one of the best ways to measure different kinds of achievement is through authentic assessments, such as products of learning and portfolios of students' work. In addition to providing real examples of what students are capable of doing, portfolios help students learn how to judge their own work and identify potential areas for growth. We realize that in this era of high-stakes testing, test scores are often the bottom line, but we have found that many policymakers and funding agencies are willing to take a broader view of achievement as long as there is solid evidence that students are learning what they're supposed to learn.

Chapter

Funding Your Technology Plan

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Funding Your Technology Plan

The Challenges of Funding

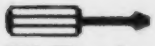
Having a well-conceived and descriptive technology plan is a critical factor for success when seeking technology funding. To reprise our analogy comparing technology planning to building a house (Chapter 2), obtaining money to pay for materials and services is an integral part of both processes. A financial lender will not give you money for your house unless you have a comprehensive plan for how you will spend it. A lender wants assurance that you will spend the money as your plan specifies. The same principle applies to technology planning. Your local school board and other funding sources such as federal and state grants or business donations and other local funding also require that you have a definite plan for using the resources that you are seeking from them.

Preparing the documentation for seeking external funding can be a complicated and time-consuming process; however, the more planning and preparation that you do, the more successful you will be in acquiring the funding. And if you already have a well-developed technology plan, you're halfway there.

If you are not able to find funding for all of the elements in your technology plan, don't give up. Most districts develop a three- to five-year plan and implement the various phases as they can afford it. Prioritizing your goals is an essential part of this process. You would not give up building your house if you could not finance everything you wanted at once. Instead, you would decide to scale back or add the currently unaffordable things at a later date.

When prioritizing your technology choices, it is critical to understand the cost of each of the components. You also need to understand the value, purpose, and impact of the various components. To return to our analogy, if you need to cut back your house construction budget, it's not a good idea to cut out the foundation or roof; this is just common sense. Unfortunately, common sense sometimes takes a back seat in technology purchasing.

It would be highly unusual if one source funded your entire plan. Therefore, you should look for various sources of funds that can be applied to various parts of your plan. Which funds you seek, when you seek them, and how you articulate your requests should all be tied to your technology plan.



Tools in this Chapter

This chapter includes recommendations and resources for you to use in the funding process.

Funding Your Technology Plan. Presented in graphical form, *Funding Your Technology Plan* shows how your strategic technology plan acts as an organizing engine for taking funds from a variety of different sources and applying them to the goals and activities that comprise your technology implementation effort. Consider this before determining where you will seek technology funding.

Strategies for Finding Financial Resources. *Strategies for Finding Financial Resources* is a discussion of the various themes we have discovered when examining how districts around our region have acquired technology funding.

Ten Tips for Educational Technology Proposal Writers. The list of tips covers key concepts and strategies to consider when creating technology proposals.

Resources for Proposal Writers. The resources listed will help you locate funding sources, develop proposal ideas, and fine-tune your technology funding proposal.

Putting the Tools to Work

Funding Your Technology Plan

As discussed in the opening section to this chapter, it is possible to understand your technology plan as an organizing engine that takes various funding *inputs* and creates *outputs* that relate to the bigger picture of teaching and learning in your district. In this diagram, we have listed some sample inputs that might be used to fund a technology plan or engine. The object is to help you see that technology funding actually comes from many different sources and is not always related simply to buying computer hardware and software.

Technology Plan

Inputs—Resources ($)	Outputs—Implementation
State Grants Technology Literacy Challenge Fund (TLCF)	
Federal Grants Education Department National Science Foundation (NSF)	**Curriculum**
Federal Entitlements Title I Title VI Perkins	**Professional Development**
Foundation Grants	
Corporate Grants	**Technology Infrastructure**
Business Partners	
Parent Supporters	
District Funds Professional Development Curriculum Technology	

Strategies for Finding Financial Resources

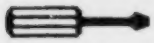
Using our experiences with school districts, we have put together the following list of important things that you should keep in mind when seeking financial resources. Several of these suggestions are drawn from *Putting technology into the classroom: A guide for rural decision makers* (Boethel, Dimock, and Hatch, 1998).

- **Funding comes from many sources.** No one grant or funding source will fund everything you need as specified in your plan. The plan is designed to show you how all of the pieces of technology integration fit together, and to set priorities for when you need to do certain things. Funding requests need to be made according to this big picture and the priorities set within.
- **Don't rely on grants and donations to cover your ongoing costs.** The initial purchase of hardware and software represents the bulk of your startup expenses; however, you need to allocate a significant portion of your school's technology budget for ongoing costs. According to research funded by the US Department of Education, you should allocate thirty percent of the overall technology budget for professional development. For every dollar you allocate to hardware purchases, you need to budget fifty cents for staff development, software, and maintenance. If you are writing a grant proposal, you should plan to spend about ten percent of the budget on evaluation. You'll need to find ways of supporting these continuing costs.
- **Look for ways to reallocate your current resources.** It will be necessary to reexamine your district's current resources and find areas that can be reallocated to cover your technology budget. If your district is like most small districts, however, you are probably stretched to your limit. Some states allow schools to use a portion of their textbook allocations for technology-related purchases. If you receive Title I funds, you may be able to reallocate some of those expenditures to support technology costs. It may be the opportunity to streamline functions and costs. And you might consider nontraditional sources, such as vending-machine revenues and revenues from renting the computer lab to community organizations.
- **Collaborate and share resources.** Many small districts are setting up partnerships with other schools or area businesses and universities to share—or trade—technology resources. A little collaborative creativity can result in substantial savings. For example, one Florida school district allows cellular-telephone companies in the area to build transmission towers at the edge of the district's football fields. In exchange, the district receives free wireless access to the Internet. Large grants from both public and private sources often require that several agencies partner in the effort. So, look at ways that several schools might collaborate with a university or another community organization. Chapter 4, *Professional Development Planning*, describes how a district might collaborate with a university to create a professional development program.
- **Explore cost-saving options, but beware of bargains.** Be sure your planning committee does its homework in investigating low-cost technology

options. Look into alternative purchasing methods such as leasing equipment or financing your purchases through low-interest loans. Find out if your state department of education has negotiated prices for hardware and software purchases. While searching for the lowest-cost alternatives for achieving your technology goals, however, beware of bargains. Saving a few hundred dollars on a computer purchase can be expensive in the long run if that purchase proves to be outdated in a year or two, requires special support, or is incompatible with the rest of your system. What seemed to be a more expensive purchase may end up as the real bargain.

- **Seek out and use federal and state resources that support technology use.** There is ever-growing federal and state support for technology use. For example, schools and libraries can get substantial discounts on their monthly Internet, telephone, and other telecommunications bills, as well as discounts on some other networking costs, through the Telecommunications Act of 1996. The biggest discounts go to rural schools and those with the highest proportions of low-income students. More information about this act and how to take advantage of the benefits of the E-Rate can be found on the School and Libraries Corporation home page at http://www.sl.universalservice.org. Many states provide a per-student technology allocation that you can include in your budget planning. Later in this chapter we have included a list of resources that you can review for ideas for new funding sources.
- **Technology funding should cover professional development.** We can't overemphasize the importance of making adequate provision for professional development and technology support. No matter how tight your budget, you cannot afford to cut corners on these two items. Technology that sits unused because of inadequate training or inadequate technical support is a big waste. Improving teaching through increased professional development opportunities is now a federal priority, so you are likely to find some external funding for supporting the professional development and curriculum development sections of your plan.

Evaluation is quickly becoming a priority. When you write a proposal for this type of funding, be sure to indicate how the professional development or curriculum work is integrated with technology and how you are going to evaluate the project's impact on teaching and learning.



Ten Tips for Educational Technology Proposal Writers

1. Read the Request for Proposal (RFP) carefully.
The first rule for writing a successful grant is to read the RFP (Request for Proposal) and then follow the RFP's rules and guidelines when writing your proposal. Not surprisingly, most unsuccessful proposals violate this basic rule. The RFP is written for the specific purpose of providing prospective grantees with all of the information that they need to write a successful proposal. Most grant makers invest a lot of time writing their RFP. They expect you to read it and follow it carefully.

2. Write appropriate proposals.
This follows from reading (and understanding) the RFP. Don't waste your time, or the reviewers' time, by submitting proposals that don't meet the guidelines of the RFP. If the RFP says that it will not fund proposals for specific items, expenditure categories, or specific populations, then do not write a proposal asking for these things. For example, if a grant maker states that it will not provide funds for hardware and software, do not write a proposal asking for funds for hardware and software. Grant makers follow their own rules to the letter, and exceptions are not made. Inappropriate proposals are rejected.

3. Follow the structure provided by the RFP.
RFPs usually provide a suggested proposal structure or format. If your RFP provides such a structure, follow it! Most of the time, the suggested structure is the basis of the checklist that reviewers will use when reading your proposal. Reviewers use a checklist to determine if each proposal has all of the required elements, sections, and so on. You can greatly improve the chances that your proposal will be approved if you organize it to their specifications.

4. Clearly state your proposal's goals and objectives.
All reviewers expect to see your proposed project's goals. If you do not clearly state them, then the assumption will be that you have none. Proposals without goals are generally not funded. Furthermore, it is important that your goals be aligned with the purposes of the grant program (as stated in the RFP) and that they be reasonable within the scope of your proposed project and resources. Good goals are at the core of all good proposals. Good objectives are measurable and can be attained within the life of the project.

5. Align your proposal with your technology-planning goals.
Good goals are also at the core of good educational technology plans. Therefore, when writing technology proposals, you should reference your planning goals. Show how your proposal supports your broader goals and how it completes some element (albeit a possibly small element) of your technology plan. Alignment with planning goals gives your proposal a big picture that demonstrates that the funds you are requesting will accomplish additional goals beyond the specific, anticipated outcomes from the proposed project.

It is worth mentioning here that technology proposals that come from districts that do not have technology plans are usually not funded. Funding agencies expect a proposal to be grounded in the long-term vision and strategies expressed in a technology plan. While it is sometimes not necessary to include your technology plan with your proposal, it is always a good idea to reference it in your proposal and/or include it as an appendix.

6. Specifically state your project's impact on teaching and learning.
What impact will your proposal have on teaching and learning? This is the bottom line of any successful technology proposal. If you cannot clearly describe the anticipated impact, it is unlikely that your proposal will receive funding. Do not make reviewers search for your anticipated impact. Do not assume that they will understand your impact unless you specify how your plan will positively impact students and their educational environment.

7. Include evaluation and dissemination components.
In many cases, the RFP will require that your proposal include evaluation and/or dissemination components. Funders are interested in projects that can measure success, document challenges, identify potential problems, and ask questions for future research. They want the projects they support to be learning experiences for a larger educational constituency and guides for future funding initiatives they might make. Therefore, they ask you to submit a study showing how the funded project has made a difference. In addition, funders want to know how you will share the outcome and learning described in your proposal through a dissemination plan.

Some proposal writers often consider evaluation and dissemination as a waste of project funds. Do not fall into this trap. Evaluation and dissemination components are critical to successful projects. Conscientious proposal writers who can visualize the big picture know they must devote sufficient project time and resources to evaluation and dissemination. Even when the RFP does not specifically ask for these components, their inclusion very much strengthens a proposal.

8. Realize that not all technology-related RFPs fund hardware.
In fact, most grant programs do not fund basic hardware, software, network access, and other infrastructure needs. At the present time, the majority of technology-related grant programs fund staff development and curriculum development. Writing a proposal for one of these programs requires a thorough understanding not only of what you will use, but how and why you will use it, and how it will have a positive impact on learning.

9. Collaborate!
Successful proposals are collaboratively written. Collaboration not only helps in terms of editing and reviewing drafts but, more importantly, it expands the ideas in your proposal. Furthermore, proposals that involve several collaborating partners are always more successful than those which are limited to a single organization,

school, or individual. A collaboration agreement shows that others share your vision and will work to make it a reality.

10. Write, modify, resubmit.

It is not unusual to have your proposal rejected the first time. Don't be discouraged, try again. Try with a different funder and, if possible, resubmit the proposal to the original grant maker. Before you resubmit an idea, however, it is wise to incorporate any feedback you received on your rejected proposal. Remember, when resubmitting a proposal it is necessary to redraft the proposal document to the new RFP (in terms of organization, components, budget requirements, etc.). Do not simply photocopy your old proposal for the new submission, and do not submit proposals that do not fully fulfill the current RFP.

Resources

Resources for Proposal Writers

The following resources should prove helpful to you in your search for funding for your district's technology plan. Programs and grants are available from many sources that range from large, complex funding efforts from the federal government to small grants from local business or parent groups. Remember, too, that there might well be sources of funding within your community, such as civic organizations and businesses.

Before you go to the following sites, however, you might want to check out the SEIR•TEC web site at http://www.seirtec.org. There you'll find links to web sites of funding agencies (some of which are listed among the following resources) as well as materials from a proposal-writing workshop that SEIR•TEC staff members conduct for districts applying for Technology Literacy Challenge Fund grants. The materials include tips for proposal writing, strategies for managing the proposal-writing process, and suggestions for what to include in each section of a proposal, e.g., needs or problem statement, management plan, evaluation plan, and so forth.

Federal Opportunities

http://www.ed.gov/pubs/KnowAbtGrants
"What Should I Know About ED Grants?" from the US Department of Education

http://www.ed.gov/Technology/inititiv.html
US Department of Education, Office of Educational Technology

http://www.ed.gov/Technology/challenge/
US Department of Education, Technology Innovation Challenge Grant

http://www.ed.gov/Technology/TLCF/
US Department of Education, Technology Literacy Challenge Fund

http://www.ed.gov/prog info/StarSchools/index.html
US Department of Education, Star Schools Program

http://www.ehr.nsf.gov/ehr/esie/TE.htm
National Science Foundation, Teacher Enhancement Program

http://www.ehr.nsf.gov/ehr/esie/ISE.htm
National Science Foundation, Elementary, Secondary, and Informal Education

http://www.neh.fed.us
National Endowment for the Humanities

http://198.3.128.64/edugate/
US Department of Defense

http://www.ntia.doc.gov/otiahome/ptfp/index.html
US Department of Commerce, Public Telecommunications Facilities Program

http://www.ntia.doc.gov/otiahome/top/index.html
US Department of Commerce, Telecommunications and Information Infrastructure Assistance Program

http://www.reeusda.gov/programs/distanced/dist.htm
US Department of Agriculture, distance learning projects

Private Entities

http://www.att.com/foundation/programs/education.html
AT&T—Educational programs

http://www.cisco.com/edu/
Cisco Systems—Virtual Schoolhouse Grant Program, Networking Academies, International Schools CyberFair, Educational Archive

http://www.microsoft.com/education/k12/
Microsoft Corporation

http://www.gatesfoundation.org
Bill and Melinda Gates Foundation

Other Resources

http://www.computers.fed.gov/school/user.asp
The *Computers for Learning* project works to place surplus federal computer equipment in schools and educational nonprofits.

http://www.aspeninst.org/rural/ foundres.html
"Foundation Resources, Community Networks, Telecenters, and Televillages," an article on private-foundation sources for rural communities, is available through the Aspen Institute Rural Economic Policy Program. More information is available through the web site listed or by contacting Aspen Institute Rural Economic Policy Program, 1333 New Hampshire Ave. NW #1070, Washington, DC 20036, (202) 736-5834.

http://www. nsba.org/itte/index.html
The National School Board Association's Institute for the Transfer of Technology to Education offers an array of print and online publications targeted for school leaders. Visit the web site listed or contact NSBA, 1680 Duke Street, Alexandria, VA 22314, (703) 838-6214.

http://www.electronic-school.com/
Electronic School

http://www.mcrel.org/products/tech/technology/funding.asp
Mid-continent Regional Educational Laboratory's (McREL) Funding for

Technology page provides access to a number of reports, articles, strategies, and sources for funding.

General Resources

American Association of School Administrators. 1995. *From here to technology: How to fund hardware, software, and more*. Arlington, VA.

http://www.ed.gov/funding.html
This web site lists all of the different grants or contracts available through the US Department of Education.

http://www.sedl.org/pubs/catalog/items/tec24.html
Boethel, M.; Dimock, K.V.; and Hatch, L. 1998. *Putting technology into the classroom: A guide for rural decision makers* (pp. 24–29). Austin, TX: Southwest Educational Development Laboratory. This publication is available online in both Spanish and English.

http://www.ed.gov/funding.html
The US Department of Education's web site has detailed information on all of the department's grant opportunities, as well as some general information for those interested in applying for federal grants.

http://www.fdncenter.org
The Foundation Center is a nonprofit organization serving grant-making private foundations and those grant-seekers wishing to locate foundations. This site contains a wealth of information on the grant-seeking/writing process as well as links to many foundations and their web sites.

http://www.ascd.org/readingroom/books/orlich96book.html
A summary of the book *Designing Successful Grant Proposals* by Donald C. Orlich is provided by the Association for Supervision and Curriculum Development online.

http://www.learner.org/sami/view-category.php3?category=fund
Created by the Colorado-based Science and Math Initiative, this site contains lists of current grant opportunities for science, math, and technology-based projects.

http://www.nsf.gov/home/grants.htm
The National Science Foundation web site provides current information on grant opportunities.

http://www.magicnet.net/~gwest/grant.htm
Organized by the director of University of Central Florida's Instructional Technology Center, this page contains a wealth of information on proposal writing and current sources of grant funding for educators.

http://www.sun-associates.com/grantwriting.html
The Sun Associates site contains links to several successful proposals and an up-to-date list of online grant resources.

Putting It All Together

A conversation about funding instructional technology

What seems to be the biggest challenge faced by schools and districts when it comes to technology funding?

We see many schools struggling as they begin trying to locate funding for their technology plans. This struggle takes place because they lack a useful technology plan created by a motivated, broad-based planning team. As a result, they lack ideas or strategies for seeking the funding they need.

In many states, schools are expected to submit strategic technology plans when they apply to their state department of education for technology funding. Prior to this, schools either did not receive any technology funding or had to find funding within their existing revenue streams. The advent of programs such as the Technology Literacy Challenge Fund (TLCF), which provides funding to states which then pass it on to schools, has changed much of this. Schools can access these funds, but they have to justify their expenditures through a school technology plan.

In theory, this should be pretty simple. It should be just a matter of creating a grant proposal that draws from the plan and the energies of the committee. In practice, however, we have found that it doesn't always happen that way.

We are finding that most technology plans and the proposals that grow out of them are lacking in specifics as to how technology will impact teaching and learning. The vision statement may spell out the connection between technology and learning, but the plan's subsequent goals, objectives, and actions relate mostly to buying hardware and software and perhaps offering some basic how-to workshops for teachers. Therefore, when a school goes to that plan to find the *fundable ideas*, they wind up with no ideas. *In other words, most technology plans do not support the generation of proposals.*

Furthermore, we often find that the committee of stakeholders is really a handful of teachers and administrators who are either dedicated to the cause or who have been drafted into the plan-writing task. We find that when the technology plan is a useful document and where the committee is truly motivated and broad-based, there is a plethora of good ideas turning into proposals that get funded! This is the reason why some schools (or districts) keep getting more and more funding while others don't receive any. We constantly observe that in the area of proposal-writing, success breeds more success. Basically, that success exemplifies a quality technology plan.

If this is a common situation, what's the solution?

Leadership is required to create a meaningful technology plan, and it is also required to secure funding for that plan. Essentially, leadership provides the safe space within which these efforts can occur. This space is defined by setting priorities that encourage and support particular types of effort and recognizing

the benefits of those efforts. Schools that have this sort of leadership are most likely to be successful in many ways—technology included.

Many educators don't realize the amount of change that the introduction of technology brings. They may set their expectations too high at the beginning or may become discouraged if the implementation process is lengthy and difficult. Sometimes, administrative support wanes after one or two grants have been won.

We have also seen districts that don't place technology high on their list of priorities. Even worse, grant funds may come in and end up being spent on other projects because key administrators do not truly honor guidelines in a proposal.

No amount of modeling or how-to lists for proposal writing will fix district or school leadership that lacks vision, priorities, or willingness to dedicate itself to making technology happen. These underlying issues need to be remedied first, so that a good foundation can be created for technology planning and implementation.

So, let's suppose that a school does have supportive leadership; the bottom line still seems to be that there is never enough funding to fully support technology implementation. How does one address that issue?

You're right, grants and proposals seldom provide full funding. The real bottom line is that schools need to redirect existing funding to support the integration of technology into the curriculum. Yes, making existing funds pay for some technology requires reallocation of funding, and this requires strong leadership.

Finally, everyone needs to realize that no plan will be 100% funded or 100% implemented. Changes and compromises will (and must) be made. The ultimate goal is to achieve the vision, and this cannot come without some degree of compromise.

This may be redundant, but could you sum up what your experience has shown to be the basic recipe for success for schools to secure technology funding?

Sure, based on our experience and in order of importance, the factors for success are:

- Strong leadership on the part of school officials
- A technology plan with concrete goals that support a sound vision of technology's role in improving teaching and learning
- Clear understanding of the relationship between curriculum and technology tools
- An energetic and skilled group of staff members who are willing to invest the time—often to some extent at their own expense—to write a compelling proposal out of that plan
- An understanding of your school's, district's, and community's needs

Appendix

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Forming Your Technology Planning Committee

Expertise	Technology Planning Committee			
	Teachers	Administrators	Parents	Others
Curriculum Design				
Professional Development				
Technology Infrastructure				
Fiscal and Budgetary				
Policy				
Process Tasks (Writing, calling meetings, etc.)				

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Technology Planning Timeline

Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	
Week 8	
Week 9	
Week 10	
Week 11	
Week 12	
Week 13	
Week 14	
Week 15	
Week 16	
Week 17	
Week 18	

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Technology Needs Survey

1. What types of activities do teachers use with educational technologies and how often do they use those activities?

2. Do teachers have access to a computer for their own use, or do they routinely use a personally owned computer to prepare materials for use in their classrooms?

3. What ideas does the staff have about what is needed to make technology more useful?

4. What student benefits has the staff observed in relation to the use of technology in the school/classroom?

5. What new software or hardware do teachers frequently request for use in classrooms?

6. What are examples of special work or projects teachers and students have done with technology?

7. Which courses or subjects most often use technology?

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Technology Inventory Worksheet (page 1 of 2)

Operating systems

Computers: include manufacturer, processor type and speed, capacity of ROM, capacity of RAM, CD drive, networked, standalone. See district property and inventory report for details.

Peripherals

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Technology Inventory Worksheet (page 2 of 2)

Other

Networks: Local or Wide Area

Telephone access

Internet access

E-mail provider

Software applications

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Core Values Worksheet

Instructions: Use the spaces below to list five reasons why technology is important to the students and teachers in your school. Start by thinking about how technology can impact and improve student learning.

Technology is important to students and teachers because:

1. _____

2. _____

3. _____

4. _____

5. _____

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Action Plan Worksheet

Goal Group:								
Statement of Goal:								
Activities	Responsible person	Begins /ends	Hardware/ software required	Other resources required	Professional development required	Budget allowed for this activity		
							Evaluation	

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Available Technology Inventory Worksheet (page 1 of 3)

Remember that you might have access to technology that is not physically located in your classroom. Check with your librarian, school technology coordinator, and/or other teachers to find out if resources exist that you might borrow or share with other teachers.

Computers

- Computers for teacher use (where and how many?)

_____

_____

- Computers for student use (portables, AlphaSmarts, lab computers, classroom computers, etc.; where and how many?)

_____

_____

Presentation and output devices

- Projection devices (e.g., scan converter, LCD, video projector)

_____

_____

- Printers

_____

_____

Input Devices

- Scanners

_____

_____

- Digital cameras

_____

_____

- Digital video cameras

_____

_____

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Available Technology Inventory Worksheet (page 2 of 3)

Internet

- Teacher access

_____

_____

_____

- Student access (Existence of Internet acceptable use policy)

_____

_____

_____

Software and applications (Note: identify what is available for teacher, students, or both)

Applications technology

- Basic productivity (word processor, spreadsheet, database)

_____

_____

_____

- Presentation manager (e.g., PowerPoint)

_____

_____

- Multimedia production (e.g., HyperStudio)

_____

_____

- Reference materials (e.g., multimedia encyclopedia such as Encarta)

_____

_____

Subject area—specific technology (Note that many applications are multidisciplinary.)

- Math software applications

_____

_____

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Available Technology Inventory Worksheet (page 3 of 3)

- Science software applications

- Language arts software applications

- Social studies software applications

- Visual Arts (e.g., drawing) software applications

- Music software applications

Communications technology

- World Wide Web/Internet

- E-mail

- Internet-based videoconferencing

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Classroom Activity Planning Template (page 1 of 3)

Description of the proposed classroom activity

Student learning objectives

What is the purpose of this activity? What sorts of student dispositions and/or attitudes will this activity support? How does this activity impact student interactions with others?

Specific curriculum objectives

How does this activity support particular curriculum objectives, framework elements, and so forth?

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Classroom Activity Planning Template (page 2 of 3)

Assessment

How do you plan to assess student achievement of learning objectives? Rubrics, indicators, and so forth?

Technology to be used in this activity

State *why* this particular technology will be used.

Nontechnology resources or materials to be used in this activity

e.g., books, original sources, manipulatives, etc.

Time necessary to complete this activity

Class days required, start to finish

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Classroom Activity Planning Template (page 3 of 3)

Activity timeline/procedure

As specifically as possible, please describe this activity on a day-by-day, step-by-step basis. Be sure to include student directions, expectations, and teacher instructions. Please use additional sheets as necessary.

Ideas for extended activities

How might this particular activity be extended to cover other curriculum units? If time were available, how might you expand this activity?

Assessment/evaluation

What are your criteria for success? How will you know that this unit has had the student impacts related to the identified learning objectives?

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Classroom Observation Worksheet

School _____ Teacher _____

Grade Level _____ Subject _____

Describe the types of computer applications the students are using in the classroom (tutorials, applications, exploration, or communication).

What is the instructional purpose of the activity?

Describe how technology is contributing to learning.

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Technology Integration Progress Gauge (page 1 of 12)

State _____

School System _____

School _____

Completed By
(Circle all that apply)

a. District Staff School Staff
b. Administrator(s) Coordinator(s)
Teacher(s) Media Staff
Other: _____
c. Entire Faculty Tech Team
School Improvement Team
Other: _____

School Contact

Person: _____

Phone: _____

E-mail: _____

Reporting For (circle)

Fall 1999 Spring 2000

SEIR•TEC Coordinator

_____

Completion Date

_____

SEIR•TEC

Technology Integration Progress Gauge

Intensive Site Project—Site Profile

The intent of this instrument is to provide a simple tool to help school leaders (a) reflect on activities to date vis-à-vis effective practices in technology integration, (b) think about what needs to be done in order to impact teaching and learning through the use of technology resources, and (c) consider strategies for maximizing the impact of technology. The instrument is not to be used as an evaluation tool or an instrument to determine a grade. SEIR•TEC will not attempt to collapse individual intensive site profiles into a single figure, such as an average or grade. Similarly, there will be no attempt to rank intensive site schools according to the profile data. Instead this instrument is to be used as a tool to develop a school profile of technology integration and impact at periodic times during the intensive site project.

The instrument consists of the five domains presented in a table format. The domains (labeled I, II, etc.) are described by two or more indicators. Each indicator has four levels of implementation. The four levels are:

- **Minimal:** Little or no evidence of implementation.
- **Beginning:** Implementation is occurring and evidence exists of capacity-building strategies in place.
- **Intermediate:** Plans exist and activities have begun for scaling up to a higher or sustainable level.
- **Advanced:** Strategies and activities are institutionalized and evidence exists that changes made will be sustained.

Technology Integration Progress Gauge (page 2 of 12)

Instructions to SEIR•TEC Intensive Site Coordinator and District and/or School Contacts

Preparation:

1. Discuss the purpose of the instrument with district and/or school contacts.
2. Determine which school team or school staff will complete this instrument. Those selected should have responsibility for technology integration at the school.
3. Provide the group an overview of the instrument and the instructions for completing the form. Emphasize that this is a tool for reflection and marking current status of technology integration.
4. Establish a process for completing the instrument (e.g., individually first, then as a group; as a total group; parts by individuals, then consensus by the group).
5. Retain one copy of the instrument for final reporting.

Instructions to Intensive Site Staff

Completion:

1. Read the indicators for each domain and determine which of the four levels of implementation of each indicator **best describes** your school at this point in time.
2. **Circle the number** corresponding to that level of implementation. Do not circle more than one number or mark a halfway point. Select the level that **best represents your current level.** Interpret "few," "some," "many," and "most" as follows:
   a. few = less than 25% of the indicated group
   b. some = 25% to 75% of the indicated group
   c. many = more than 75% of the indicated group
   d. most = almost all of the indicated group
3. In the Comments/Supporting Information block, add information to describe the status of your project and list the sources for your decision. The responses in the Comments/ Supporting Information block will be useful on subsequent completions of the Gauge in order to establish progress.
4. Use the three empty tables at the end of this instrument to add indicators that help describe other technology-related activities at your school. Completion of these empty tables is optional but may be necessary to provide a complete profile of technology integration and impact at your intensive site school.

Technology Integration Progress Gauge (page 3 of 12)

Instructions to Intensive Site Staff and SEIR•TEC Coordinator

Reporting:

1. Prepare a final copy based on the decisions by the group.
2. Verify the contact and completion information at the top of page 1.
3. Make copies and distribute as follows:
   a. Original to SEIR•TEC Director
   b. Copy to intensive site school contact and/or district contact
   c. Copy for SEIR•TEC Intensive Site Partner
   d. Copy for SEIR•TEC Intensive Site Coordinator

Glossary

Community—Group including school members as well as public and private individuals, businesses, and /or agencies in the area served by the school.

Higher-level learning—Student activities involving one or more of the following: peer collaboration, integration of higher-order thinking skills, self-directed tasks, multidisciplinary assignments, authentic learning opportunities (based on real-world events or tasks).

Technology Integration Progress Gauge (page 4 of 12)

Domains and Indicators

1 Level of Student Engagement

There is evidence that:

A. Students are involved in higher-order thinking skills activities supported by technology.

1	2	3	4
Few, if any, students are involved in learning activities requiring peer collaboration and interaction, technology applications, or higher-order thinking skills.	Some students are participating in technology-based learning activities requiring peer collaboration and interaction as well as higher-order thinking skills. A few students are sharing their technology skills in collaborative groups.	Many students are involved in authentic, technology-based learning activities requiring peer collaboration and interaction as well as higher-order thinking skills to solve real problems.	Most students are involved in self-directed, authentic, technology-based learning activities that are multidisciplinary and require peer collaboration and interaction as well as higher-order thinking skills to solve real problems. New products and understandings are evolving.
Comments/Supporting Information:			

B. Students are meeting the school's expectations for levels of technology use.

1	2	3	4
A few students are achieving levels of appropriate, initial technology use in learning activities, as defined by the school or school/district technology plan for their grade and the stage of implementation of the plan. Some students are exploring more advanced uses of technology.	Some students are engaged in activities to build the technology use skills expected for their grade and the stage of implementation of the school/district plan. Many students are achieving the expected levels and some students are developing skills in more advanced uses of technology.	Many students are applying the technology use skills and have documented mastery of the school expectations for their grade and the stage of implementation of the school/district plan. Many students are exploring more advanced uses of technology and some are demonstrating mastery.	Most students have met the school's expectations for technology use for their grade and for the stage of implementation of the school/district plan. Most are using regularly the skills mastered and are continuing to develop skills in more advanced uses of technology.
Comments/Supporting Information:			

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Technology Integration Progress Gauge (page 5 of 12)

2 Environment for Teacher Engagement

There is evidence that:

A. Teachers design and implement technology-based learning experiences that promote higher-level learning for students and authentic assessment.

1	2	3	4
Few or no teachers design and implement student activities that require peer collaboration or integration or use of higher-order thinking skills. They are using technology mainly for demonstrations with minimum adaptations and little integration into their ongoing program. Most teachers plan and teach in isolation.	Some teachers design and implement student learning activities requiring peer collaboration and interaction as well as use of higher-order thinking skills. Groups of teachers are collaborating on use of specific technologies and resources and some are implementing the ideas individually or as a team. Some teachers are using technology for assessment.	Many teachers design and implement authentic learning activities requiring peer collaboration and interaction as well as use of higher-order thinking skills to solve real problems. Many teachers are planning and teaching collaboratively, using specific technologies and resources. Some teachers are designing authentic assessment tools using technology resources.	Most teachers design and implement technology-based, self-directed, multidisciplinary, authentic learning opportunities requiring peer collaboration and interaction as well as use of higher-order thinking skills. Many use technology resources to plan and teach collaboratively and to design authentic assessment tools.
Comments/Supporting Information:			

B. Teachers demonstrate the expected level of technology use. (Levels from ACOT Study.)

- Entry: Teachers are inexperienced and, possibly, inefficient in the use of technology. Many have misgivings regarding technology innovation, and frustration is common.
- Adoption: Teachers begin to incorporate technology into existing teaching practice, primarily to teach about technology and as a means of delivering traditional instruction.
- Adaptation: Teachers are integrating technology into the traditional teaching day. Classroom practices are still primarily traditional, but use of the computer as a tool is pervasive. Productivity and increased performance on traditional measurements are used as indicators of success.
- Appropriation: Teachers use technology in everything they do, to the point that the use of the technology in the lives of teachers and students is almost transparent.

Technology Integration Progress Gauge (page 6 of 12)

Invention: Teachers are experimenting with new roles and new instructional strategies. The entire classroom is transformed and students are more engaged in learning and more self-directed.

1	2	3	4
Almost all of the teachers are engaged in activities typical of the entry stage. A few, if any, are beginning to model actions typical of the adoption stage.	A majority of the teachers has reached the adoption stage. Some teachers are beginning to discuss how to adapt the technology to teaching and learning with a few beginning to try customized versions of existing resources.	A majority of the teachers is engaged in the activities typical of the adaptation stage. Some of the teachers are beginning to combine technology resources and instructional strategies using technology in all learning activities.	A majority of the teachers is engaged in activities typical of the appropriation stage. A few teachers have begun exploring areas associated with the invention stage.
Comments/Supporting Information:			

C. Teachers integrate technology into all subject areas, using resources that map technology to curriculum.

1	2	3	4
Few teachers are aware of technology resources that support specific topics or lessons. There is no correlation or mapping of the existing resources to the curriculum. Few or no teachers are integrating technology into subject areas.	Teachers have access to a school inventory of available technology tools and resources. Mapping the technology resources to the curriculum has begun. Some teachers are piloting technology integration strategies and lessons.	Mapping the technology resources to the curriculum has been completed. Many teachers have been introduced to the guides that map technology to all subject areas. Some teachers have begun using them in their day-to-day instruction. Many teachers have begun limited technology integration lessons.	Most teachers are integrating technology into all subject areas, using the guides that map existing technology resources to the curriculum.
Comments/Supporting Information:			

Technology Integration Progress Gauge (page 7 of 12)

3 Availability and Accessibility of Appropriate Resources

There is evidence that:

A. Technology resources are available and are being used to support a variety of student and teacher experiences.

1	2	3	4
Few teachers and staff know what technology resources are available and how to operate them. Few technology resources exist. They have not been inventoried recently nor checked for operational status.	Some teachers and staff are learning to operate specific technology equipment. Some technology resources have been checked and inventoried by location and primary use.	Many teachers have received information on the technology resources available. Some teachers have used selected resources for instructional activities.	Most teachers are using a wide variety of the available technology resources.
Comments/Supporting Information:			

B. Technology has been allocated in such a way as to support its constructive use in the teaching and learning environment.

1	2	3	4
No plan exists to allocate technology resources to maximize the impact on teaching and learning. Location of existing technology resources is based on past use, initial program purchase, or personal request. Few, if any, teachers have expressed an interest in a change in the allocation of the technology resources.	Some discussions have occurred to design an allocation and replacement schedule to support constructive use of technology in the classroom, labs, and media center. For example, a school technology team is studying the current allocation of technology resources and the related allocation policies.	A plan is being implemented to allocate the existing technology resources for maximum use and impact on student learning. Work is in progress to design an allocation schedule for future purchases and routine upgrades. Individuals are identified to be responsible for maintaining this allocation process.	The technology resources in the school are available for just-in-time learning experiences, whether through a checkout standalone mode or by a networking environment. School staff has input on allocation of existing and new technology resources.
Comments/Supporting Information:			

Technology Integration Progress Gauge (page 8 of 12)

C. School individuals have equitable access to technology.

1	2	3	4
Limited access to the technology resources is available to the school staff during school hours and from school locations. Discussions may be occurring on extending access, from off-school sites and beyond the school day.	A group of school staff is testing access to school technology by checkout and by telecommunications after school hours and from homes. The school is developing policies on access to school technology by staff and students.	A policy exists for use of school technology by staff and students and has been shared. Guidelines on equitable use are being developed. As a result of the pilot testing, an expanded number of staff and students are now using school technology resources.	Technology resources are accessible to the school staff and students on an equitable basis and from off-site locations and beyond school hours. Access is based on policies in the school technology plan. Staff members are making routine use of the resources.
Comments/Supporting Information:			

Technology Integration Progress Gauge (page 9 of 12)

4 Organizational Support

There is evidence that:

A. Organizational structure exists for support of all aspects of technology integration.

1	2	3	4
Within the school and the district, there is little to no organizational structure to support technology use or set direction for technology integration.	The need for support of technology integration has been recognized and school staff members have been assigned to provide minimal support. A group has formed to identify what type of support is needed for technology integration.	Individuals are identified to provide hardware and instructional support to staff. The school is addressing reports on or requests for support needed for successful technology integration.	School and district leaders have designated personnel and approved a process for supporting technology integration via training, maintenance, technical assistance, purchasing consultation, and instructional modeling. Periodic input on the support needed is gathered.
Comments/Supporting Information:			

B. Organizational capacity fosters transformations in school leadership to support technology and the changes it brings to teaching roles and methodologies.

1	2	3	4
No policies exist at the school or district level that encourage school leaders to use technology. Few opportunities occur for school leaders to gain technology skills or to witness use of technology in the instructional program at model schools or conferences.	School leaders are beginning to use technology for work and to participate in meetings and sessions on technology use in changing teaching and learning in the classroom. Discussions have occurred about developing policies on the use of and support for technology by school leaders.	Many school leaders are using technology routinely for their work and are supporting requests from teachers to gain technology skills or participate in events focusing on technology integration. The school is developing policies that will foster use by and support from school leaders for technology and change.	Policies exist and opportunities occur regularly from the district and/or regional level that encourage school leaders to be users of technology and to support technology in the instructional program. As a result, most school leaders routinely use technology themselves, initiate reviews of technology use, and encourage use by staff.
Comments/Supporting Information:			

Technology Integration Progress Gauge (page 10 of 12)

C. Policies exist that support the equitable availability and use of technology.

1	2	3	4
Neither school nor district policies exist on equitable availability and use of technology.	School and/or district policies have been developed for equitable availability and use of existing technology. Random strategies are being implemented to ensure equity.	A school plan for implementing technology to ensure equitable availability and use for teaching and learning is in place. Successful strategies for equity are being identified.	Schools are following district policies on equitable availability and use of technology. Technology activities based on equitable availability and use are incorporated into school improvement plans and staff professional development plans.
Comments/Supporting Information:			

D. Effective and ongoing staff-development opportunities exist to support capacity building for using technology to improve teaching and learning.

1	2	3	4
Although technology-based staff-development topics have been identified, only a few, unrelated technology-based staff-development activities have occurred.	Some technology-based staff-development sessions have occurred and initial activities resulting from the sessions have been tried in classrooms. Teachers have begun seeking ways to integrate technology.	A staff-development plan, including evaluation of student and staff needs, exists for using technology to improve teaching and learning. Some teachers are collaborating on best practices in using technology in teaching and learning. Teachers are being evaluated on their effective use of technology as a result of training sessions attended.	School and district administrators support continuous staff-development opportunities for improving teaching and learning, with seamless technology uses. A committee exists to provide long-range planning on technology-based staff development and sharing of best practices. Use of technology effectively is an integral part of the teacher evaluation process.
Comments/Supporting Information:			

Technology Integration Progress Gauge (page 11 of 12)

E. Teachers and administrators use technology as an information management tool.

1	2	3	4
Although teachers and administrators are aware of information management tools, few, if any, staff members are using such tools.	Some school staff members have access to and have received training to use information management tools.	Many school staff members use information management tools for daily classroom tasks and for submitting reports and documents. Some staff members are seeking new tools and additional uses for existing tools.	Most school staff members prepare and submit reports and documents using information management tools as required by administrators. Many school staff members provide regular input on new tools needed.
Comments/Supporting Information:			

Technology Integration Progress Gauge (page 12 of 12)

5 Community Involvement

There is evidence that:

A. Community supports the school's integration of technology in teaching and learning.

1	2	3	4
Plans may have been developed but not implemented to inform the community of the school's efforts to integrate technology.	Some segments of the community are knowledgeable of the school's efforts to integrate technology into teaching and learning.	Many community groups have plans in place and have begun activities to enhance the current technology integration activities of the school. Community members are meeting with school groups to plan technology integration activities.	Most community groups support technology integration into the school's teaching and learning environment by maintaining a consistent presence in school activities. Ongoing school committees are required to include community members.
Comments/Supporting Information:			

B. Community shares in the use of the school's technology.

1	2	3	4
Few or no plans exist for the community to use the school's technology.	Some school and community members are developing policies and strategies for community members to use the school's technology; e.g., for after-hours adult literacy training or e-mailing with teachers.	Several community groups are beginning to use the school's technology according to approved policies and guidelines.	The school and community members actively promote community groups' use of the school's technology.
Comments/Supporting Information:			

Professional Development Idea Worksheet (page 1 of 4)

Integration Idea

_____

_____

_____

_____

Impact

(It's not necessarily true that every idea will impact each of the following populations, but if your integration is truly systemic, there's a good chance that it will. In a sentence or two try to describe how your idea for technology implementation will impact each of the following.)

Impact on Teachers

_____

_____

_____

Impact on Students

_____

_____

_____

Impact on Administrators

_____

_____

_____

Impact on Community and Others

_____

_____

_____

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Professional Development Idea Worksheet (page 2 of 4)

Hook to your District (or School) Technology Plan

(All aspects of technology integration should be reflected in the vision and goals of your strategic technology plan. Describe below how your idea for integration supports one or more goals in your technology plan.)

Who's Responsible?

(Who will take the lead responsibility on various aspects of your professional-development idea? Once again, not every idea will have all of these aspects, but most will.)

Professional Development

Technology Infrastructure (hardware, software, and network installation, maintenance, support, etc.)

Communication/Documentation of Success (Who's going to tell your community about the outcomes from implementing this idea?)

Other

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Professional Development Idea Worksheet (page 3 of 4)

Timeline

Use this space (or another sheet) to create a step-by-step procedure for implementing your idea.

Who?	Does what?	When?

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Professional Development Idea Worksheet (page 4 of 4)

Evaluation and Reflection

Nothing fancy here, but just take a moment to describe how you will know whether you were successful in the implementation of your idea. Will there be interim project benchmarks? Will there be something that you can qualitatively describe or quantitatively count as outcomes from your idea?

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Community Resources Worksheet

Type and name of organization	Potential contribution or collaboration	Contact person	Who will contact them?
Colleges/ universities			
Libraries/ museums			
Business organizations			
Local businesses			
Religious organizations			
Community organizations			
Local media			
Telecommunications or technology organizations			

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Software Selection Framework

Desired subject areas (e.g., mathematics, language arts, social studies, etc.)

Targeted grades

Intended use (What curriculum objectives will it serve? When during the year will it be used? How many students will use it?)

Type of software (i.e., tutorial, communications)

Teachers/departments using the software

Special student considerations (primary language, special needs, etc.)

Infrastructure considerations (hardware platform, network requirements, multimedia, special support, etc.)

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Educational Software Evaluation (page 1 of 2)

Evaluator _____ Date Published _____

Today's Date _____ Age/Grade Range _____

Software Title _____ Platform _____

_____ _____

Cost _____ Network Version? _____

Publisher _____ System Requirements _____

Subject Area(s) _____ _____

---

1. What is the overall purpose or use of this software application?

   _____

   _____

   _____

2. How would you best classify the use of this software?

   a. Tutorial (including drill and practice)
   b. Exploration
   c. Application or productivity tool
   d. Reference
   e. Entertainment
   f. Other_____

3. Does the content appear educationally sound and well-researched, e.g., does it mesh with national standards and curriculum frameworks, is the information current and free of bias and stereotype?

   _____

   _____

   _____

   _____

4. Is the program sufficiently easy to maneuver through, e.g., does it allow you to save your work at any point, can you easily return to a main menu or orienting point, are the graphics and icons clear?)

   _____

   _____

   _____

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Educational Software Evaluation (page 2 of 2)

5. Describe how you envision your students using this software, e.g., would they be working alone or in cooperative groups, in the classroom, laboratory, or library, as part of regular classroom work or as an add-on, reward?

6. What do you most like about this software?

7. What do you like least?

8. What are your impressions of the supporting documentation, e.g., installation and troubleshooting instructions, teacher's guide, lesson plans, extension activities?

9. Does the cost of the software seem appropriate? Is there enough flexibility to allow students to use the program multiple times, can the difficulty level grow with the student, are you paying a premium for fancy graphics that don't necessarily impact the learning experience?

10. Does the publisher offer technical and educational support for its products? How accessible is this support, how quickly do they respond, are they sensitive to the needs of teachers using the program in a classroom setting?

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Evaluation Committee Composition Matrix

To create and conduct your technology evaluation, you need a committee composed of educational stakeholders *who will actively work* to help create the evaluation. Remember:

- You will need committee members who represent *all* aspects of your school community. This means teachers (from a variety of grades and/or subject areas), administrators, parents, community members (e.g., businesspeople), and perhaps students.
- Do not load your committee with figureheads who are not willing to actually work on the plan.
- The evaluation process contains many different tasks. You need writers, curriculum people, infrastructure people, people who are good with budgets, and policy people.
- The commitment to be a part of the technology-evaluation committee is not a short-term commitment. A formative evaluation by definition is ongoing and iterative. The committee members should be willing to assist in your school's technology-evaluation efforts long after the data are collected and reports are written.

	Teachers	Administrators	Parents	Others
Curriculum				
Professional Development				
Infrastructure				
Process Tasks (editing, calling meetings, etc.)				

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Technology Evaluation Organizing Questions

When thinking about program evaluation, it is useful to consider some organizing questions. Working in groups, please answer the following questions. Be prepared to report out your answers at the conclusion of the group work.

1. This evaluation will evaluate various aspects of how well technology has been integrated in your schools and district. What does *integration* mean to you? Provide some examples.

   _____

   _____

   _____

2. All programs must have a driving purpose. What is the best reason your district has implemented and integrated technology as a part of its teaching and learning environment?

   _____

   _____

   _____

3. Evaluation is about measuring change. When evaluating how well your schools and district have integrated technology, what sort of changes do you expect to see as a result of this integration?

   _____

   _____

   Changes related to teachers?

   _____

   Changes related to students?

   _____

   Other changes?

   _____

4. Change produces results. Evaluation measures those results against expectations. Identify three aspects of technology integration that can be measured in order to evaluate the change that has occurred in your schools and district as a result of technology integration.

   a. _____

   b. _____

   c. _____

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Developing Indicators Worksheet

Working with a small group of stakeholders, identify 3 (or more) indicators for each of the following categories.

An indicator is a simple statement of *what you would expect to find or see* that demonstrates a particular attribute. For example, one indicator of the season known as summer might be: "Warm temperatures inspire people to wear lighter clothing." Inversely, if we see people wearing light clothing, one possible conclusion (applying our indicator) is that the season is summer.

Effective Use of Technology

1. _____
2. _____
3. _____

Technology's Impact on Students

1. _____
2. _____
3. _____

Technology's Impact on Teachers

1. _____
2. _____
3. _____

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Classroom Observation Template

School	
Teacher	Grade/Subject
Class Size (est.)	
Observer	Date

Teaching—Learning Methods (e.g., direct instruction, project-based learning)
Brief Description of Classroom Activity/Lesson
Student Groupings (single, small, large, etc.) and Interactions
Technology (hardware and software) and/or Instructional Materials In Use
Number of Computers in this Classroom
Other Notes

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Sample Teacher Focus Group Questions (page 1 of 5)

Student Access and Use Questions

1. Describe how your students typically use lab or classroom computers.

2. What kind of software is available for student use in the classroom or lab?

3. How do students typically use the computers...and why? (i.e., probe for the reasons why they favor a particular pattern of use...e.g., "You can't do anything with one computer; each student needs to work individually;" class management issues; etc.)

4. Could you give me an estimate of the percentage of students who have access to a computer at home?

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Sample Teacher Focus Group Questions (page 2 of 5)

5. We're interested in your impressions of how the information technology you have just described has impacted your students' learning. Overall, how have students been impacted by the use of technology in your school? (probe for examples, evidence)
   Special or specific assessments?
   Nothing in addition to nontechnology-specific assessments.
   Other?

6. How do you evaluate your students in terms of their technology use?

7. What does technology allow your students to do now—either physically or intellectually—that would have been impossible (or at least more difficult) before technology was widely available in your school? (allow for the fact that they may not think that technology is *currently* widely available)

8. What changes could be made to technology in your school that would allow *your students* to benefit more from technology?

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Sample Teacher Focus Group Questions (page 3 of 5)

Teacher Fluency Questions

9. Please describe how you *most frequently* make use of school computers. We don't want to know all of what you do...just what you most often do. (probe for uses directly related to instruction, administrative uses/record keeping, personal productivity, etc.)

10. OK, that's what you most frequently do. Now tell us some of the other things...regardless of how often you might do them.

11. If not on your desk or in your classroom, where do you use computers most often?

12. Do you have access to a computer at home? (yes or no answer)

13. How accessible are the classroom or lab computers to teachers throughout the day?

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Sample Teacher Focus Group Questions (page 4 of 5)

14. What, if any, impact has the use of information technology had on your teaching? (probe for the following list without reading it)

15. In what ways has your professional practice (i.e., teaching) improved through the use of technology? (designed to be pretty open-ended. Allow for the fact that the improvement may have been mostly negative)

16. What barriers have you encountered in trying to use technology in the classroom?

Teacher Vision/Strategy Questions

17. How do you get your ideas for integrating technology in the classroom?

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Sample Teacher Focus Group Questions (page 5 of 5)

18. What is the most interesting or intriguing use of technology in education that you have ever heard about? It doesn't matter to us whether you can actually DO this yet...we just want to know what you find interesting.

Teacher Access and Professional Development Questions

19. What changes would you like to see made in your school with regard to how technology is allocated or structured? (note that they may comment on both physical infrastructure as well as support issues)

20. How often is technology staff development offered at your school and/or in the district...and who is responsible for conducting this training?

21. What barriers have you encountered in terms of getting the technology training you want and/or need?

22. What has been the most useful use technology workshop you have attended, and why?

23. Is there anything else you would like to share with us?

Thank You for Your Time!!

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The Computer, The Discipline and the Classroom: Two Perspectives

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Abstract: The authors present two case studies in the use of computers in the classroom, one involving an introductory computer science class, the other an upper division literature class. After describing each case, the differences are discussed, showing that pedagogical models developed for one discipline may not transfer to another, and that the discipline itself, beyond instructor's preferences or institutional policies, may determine what works and what doesn't.

Introduction

Our goal in this paper is twofold. First, we'll indicate that the successful use of information technology in the classroom depends more on the synergy between teacher, student and the learning context than on the technology itself. The use of technology -- as the primary vehicle for teaching (distance learning) or as an adjunct to the more traditional classroom -- is effective only insofar as it addresses this synergy. Second, we will maintain that one under-appreciated factor influencing teachers, students and learning contexts is the discipline itself, in a way that goes beyond simply payin, appropriate attention to learning (or teaching) styles. We offer two case studies, one drawn from an introductory computer science course, the other from an upper division literature course, in support of these claims.

Enthusiasm for online learning is of course high for students who live in areas not easily served by the traditional classroom, and courses accessible anytime and anyplace can provide valuable learning experiences for mature students who work full time and take courses when schedules permit. But the use of online learning tools *within* traditional campus-based course delivery structures has become popular as well [1]. James Duderstadt, President Emeritus and Professor of Science and Engineering at the University of Michigan, suggests that universities must themselves take a leadership role in remodeling the universities of the 21st century, and that new information and communication technology tools will play a key role in that mission, suggesting that universities will continue to have a physical existence, whatever their virtual roles may become[2]. This is not a completely uncontroversial claim; in a New York Times article, John Chambers, then Chief Executive Officer for Cisco Systems, asserts that "the next big killer application for the Internet is going to be education. Education over the Internet is going to be so big it is going to make e-mail usage look like a rounding error." [3].

As the situation has developed, however, and as other researchers have begun to look at what now seem to be inflated claims, online education has emerged as one aspect of a larger picture. Prosser and Trigwell [4] argue that both teachers and students benefit from an increased awareness of their own personal experiences, approaches and perceptions of the learning process and that this awareness facilitates positive learning outcomes. In particular, they emphasize that "good teaching involves an awareness of students' perceptions of teaching technologies (including information technology) used in teaching" and that these perceptions can significantly impact the learning experience either positively or negatively. Given their results, the successful use of information technology in the classroom is clearly more dependent

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on interactions between teachers, students and learning contexts than on the technology; it may even indicate that there are some things technology cannot appropriately do, a point to which we shall return.

On the other hand, learning opportunities newly available through the use of technology can support desired learning outcomes—provided (our second claim) those outcomes, as defined not simply by the instructor or the institution but by the discipline *itself*, are congruent with what the technology can provide.

Astin's comprehensive study of student development characteristics in various higher institutional settings [5] points out that active engagement of students in interdisciplinary courses, course with discussions, debates, and class presentations strongly correlates with critical thinking skills.To the extent that technology can facilitate (or at least create the opportunity to provide) such active learning strategies, the effort will not only increase student involvement in the course, but also increase understanding of course concepts by relating them to independent inquiry and debate.

The question is whether available technology can actually do that.

Case Studies and Examples

Our first case study involves an introductory computer science class. Pope's goal in implementing web-based tools the course was to increase opportunities for communication and participation. The class was small (approximately 25), but there was a considerable amount of material to cover and the topics that dominate the headlines -- Microsoft Antitrust litigation, Privacy in Cyberspace – provide fertile ground for discussion. He began using WebCT as a tool both for distributing informational materials and for on-line testing. In doing this, he relied on the students to read on their own time; his discussion/lecture now addresses related but different concepts in supplementing the text. Making the quizzes available online provided more opportunity for group and class discussion.

Students were positive; they could find their grades, course syllabus, assignments and topic notes in one central location.

In designing this kind of structure Pope was of course not alone. The University of Central Florida, for example, adopted a similar approach to improve its course in American National Government. There, the goals of the restructuring were practical as well as mission-oriented. The course enrolled over 2000 students in sections of 80-100 students. Classroom space was in critical short supply; increasing the number of sections was not a viable option. But the course also had a retention problem and surveys indicated that partially web-based sections had somewhat higher retention rates. Building on this, the department designed a web-based asynchronous learning environment based on web-based modules to encourage student participation. Class meeting time was reduced by two thirds. Bruce Wilson reports "students are, by necessity, more actively involved in the learning process. And instructional technology can also enhance students' critical thinking skills. ... The use of the Internet in teaching Political Science gives instructors more opportunities to design activities that involve students' direct participation and to follow clearly set instructional goals." [6]

Herman D. Lujan [7] alludes to the tendency of many faculty to "narrowly define 'good' teaching and learning as something that occurs in a time-bound, synchronous classroom setting." Pope believes that students in his computer science course benefit not only from in-class – 'synchronous'– discussions and demonstrations but also from the ability afforded by new online tools to communicate and learn using the tools that promote asynchronous learning opportunities.

Unlike Lujan, however, Pope is not convinced online learning fits in every teaching and learning context. It fits in this course because much of the material and the broad topics under review can be organized in a modular fashion and students can easily take part in discussions outside of the class context using WebCT. Fine for an introductory class, not so fine for an upper division, seminar-style class in advanced topics in mathematics.

This class meets twice a week – once in a regular classroom and once in a hands-on computer lab. But based on his experience Pope has come to believe that hands-on access is a more critical component of the instructional paradigm than the web-based asynchronous tools. This is a rather tame observation in 2002 – the case for instructional computing labs in science and computing education was made by the mid 1980s; nevertheless, the classroom context heavily influences teaching methodology. Without the lab, there'd hardly be time, and fewer topics, for discussion! The point is that successful teaching requires the clear evaluation of the goals of the course [derived from the discipline], the context in which the teaching and learning takes place [the classroom itself], and finally the learning strategies that best fit both.

Finally, Pope also viewed the electronic interface as an opportunity to evaluate his own teaching. In any implementation of electronic technology in the classroom, a major evaluation of course objectives and teaching strategy is required, and he found this to be a welcome necessity. Drawbacks were a lengthy development and the availability of trained support staff.

Thurber, teaching an upper division class in English literature, had a different experience. It was not obvious to him that the standard distributed education model was appropriate, given both the mission of the university and his actual task, which was to investigate, in this case, the work of the English poet William Blake. He does not give quizzes as such, although short exercises related to that moment's discussion do take place; there is no "lecture" and therefore no lecture notes. The course itself, in addition, was already as "interactive" as he (and his 24 students) could stand. Instead, the goal was to use the Web to investigate the nature of hypermedia, particularly as the poet in question, Blake, had done an 18th century version of the same thing. His goals, therefore, were far more specific to the actual material—more contingent, more dependent on the actual poetry than on any idea about how to teach poetry.

He created, therefore, a course website (www.sandiego.edu/~thurber/CyberBlake) and asked the students to create their *own* hypermedia websites in lieu of the traditional paper—the rationale being, once again, not simply that hypermedia may be worth investigating on its own, which it may be, but that, given this poet's practice, hypermedia are an appropriate, perhaps the most appropriate, response. The student's response was positive, in each case suggesting that the course be given again. Typical remarks included "It's about time English Departments did this," "an English course that is actually practical," and "I feel like I'm a writer too, doing something a little bit like Blake."

The course model that evolved, however, has almost nothing in common with Pope's. There was a course discussion board; very few students used it, feeling that opportunities for interaction were already sufficient; a few found it intimidating, while others viewed it as just another course assignment. (Participation in the discussion board was optional. Thurber wanted to see what would happen if it was not required.) There were electronic office hours; no one ever showed up, as students uniformly felt either that they already had sufficient access to the instructor, or that personal interaction was preferable. The emphasis was on the student's ownership and exploration of an electronic medium, the Web, rather than on using the Web to enhance communication or provide additional course materials.

Observations and Conclusions

It is about the differences between these two course structures that we would like now to reflect. Crucial to Pope's model was the use of the Web in the transferal of information from the instructor to the student. Indeed, he viewed, as is common, class sessions as adjuncts or supplements to information provided online.

But this is already not a model that transfers readily to an upper division literature class. Advocates of distributed learning have traditionally emphasized that the use of electronic communications present opportunities for teacher-student interaction that effectively shift the educational focus from "teacher-centered" to "student-centered," away from the traditional lecture format and towards distributed learning. But is the "transmission" of information, by itself, what college courses are for? If so, never mind the traditional lecture; colleges have been masquerading as libraries or, now that the technology is available, web sites. As far as the humanities are concerned the "transmission" of information is only one function college courses serve, and in some respects the least important.

While we acknowledge that modern educational philosophy mandates the critical importance of engaging the student in interactions that will impact his or her mastery of the subject matter, it does not then follow that the hallmark of student-centered learning is the use of computers in the classroom. Particularly if, as at our university, classes are small and instructors, on the whole, couldn't lecture if they wanted to. Is the give and take in small, discussion-centered, quasi-seminar situations comparable to what we can do in online discussion groups, even with real-time audio and video? If it isn't, what are the differences, and what is the educational impact of those differences? In the absence of hard answers to those questions, we wonder what's really at stake. What is being transmitted, pre-eminently in literature classes but in the humanities generally, is not the "information" we possess about, for example, Shakespeare, which is trivial, but the nature and kind of conversations we have and have had about his work. Knowledge in the humanities is both a process (not a result) and always contingent, socially constructed and crucially dependent on the context in which it is acquired. (The French Revolution in the eyes of post-1848 Europe was one thing; to Woodrow Wilson it was another; to ourselves it is yet

something different.) From this perspective the transmission of information via the web is a non-sequitur. It isn't the Web that's the problem; it's the word "transmission."

Using computers according to the first model, therefore, at least interferes with and may even negate the goals and methods of the humanities—not because humanities instructors are Luddites (some are), but because the pedagogical model such approaches embody originated in one discipline, or set of disciplines, and don't readily transfer to another. Using computers according to Pope's model would deny Thurber and his students the chance to do what they want to do, which is both to learn what a writer actually did and to forge a response, together, to what she actually did. Here is where the under-appreciated difference between disciplines-- world views, at some point-- comes into play. There is no, and there had better not be, any such thing as socially constructed knowledge in the sciences. (Actually this is a matter of current debate. What physicists thought about the significance of Maxwell's equations in 1890 was a different than what Einstein thought fifteen years later.) In the humanities, on the other hand, and particularly in literature, there is no knowledge *except* what has been socially constructed -- beginning with the fact that literature is made of language, the most social of all constructions, and including the fact that no writer, no matter how august, is a writer unless someone, somewhere, chooses to read her. The artist has an intent, to be sure, but that intent is only one of many variables connected to our mutual investigation of what a work actually is. Reader-response theory, as a matter of fact, would have us believe, in general, that readers are actually as responsible for what a work does as the author is -- maybe more so, in some constructions. Whether that is true or not, none of us reads or could read Shakespeare as Shakespeare did; but we still read Shakespeare! What's that, then? Shakespeare is Shakespeare but he's also us reading Shakespeare, in ways that he could not have foreseen but which are, still, what Shakespeare "is." For now. Meanings change; there are no "laws" in the sense that there are for the hard sciences.

Thus when Pope says, for example, that it's a good thing that online discussions can happen any time, that it frees people from the constraints of time and space so that they can say anything from anywhere, Thurber's response is -- why is that good? It would depend on the crucial insight that online discussion is the same as or better than the kinds of discussions his students and he have in real time, with their real bodies and their real minds in a real place, zoned into a writer they want to try to understand. Is virtual discussion discussion? (We know, for example, that people write and talk differently, and that they behave differently on- or off-camera. What are the differences, are they significant, and are virtual discussions better than, the same as, or worse than virtual discussions? And for what ends? There has been surprisingly little research in these areas, particularly as different disciplines are involved.)

Even, Thurber notices, Britain's Open University, one of the oldest and most successful implementations of computer-based instruction (http://www.open.ac.uk), supplements online material with local study centers (and tutors) at learning centers around the world. On this model, the discussion, always specific, always local, and always the joint product of the persons present on that occasion, is preserved, together with ancillary electronic material and the opportunity, which he welcomes for his classes, for students to write back at the sea of electronic media they are surrounded by, owning the web by helping, in a small way, to create it.

Thurber makes one further point, however. Crucial to his thinking about the use of computers in the classroom is what he has taken to be the centrality of hypertext (and hypermedia) in the classroom. As things have developed, however, he is beginning to wonder whether hypertext —at least as it was once envisaged—has failed. If it has, the use of computers —any computers at all-- in his classroom becomes problematic.

In one sense, of course, it is absurd to say that hypertext has failed—the Web itself is evidence that it has not-- not to mention media-rich computer programs, whether or not they live on the web. Hypertext, and more generally hypermedia, are the cornerstone upon which contemporary electronic communications stand, the cornerstone as well of the new IT economy, with its multiple and still evolving political, social, and psychological impacts. Hypermedia used creatively, moreover, as a medium of expression with its own aesthetics, continues to be produced, if in small quantities. It was this last area—the possibility that interactive technologies could be the means by which student author-readers could create new kinds of texts— that most interested and excited Thurber.

But in this context the early promise of hypermedia has not been realized. We do not go to see interactive movies, though attempts have been made, nor, on any meaningful scale, do we find ourselves reading interactive novels. Hypermedia on the web and elsewhere have developed as economic, more than literary or artistic, engines. Interactive games are arguably interactive fiction-- but games more than fiction, image more than text; but text—language-- is at the heart of Thurber's commitment to his own discipline.

It is true that interactive textuality continues to be investigated in the academy—notably at Brown University, MIT, the University of Texas at Austin—but these attempts too have failed to generate impact beyond those who are already persuaded. Hypertext has not swept away text; hypertext fictions bear approximately the same relationship to fiction that performance art bears to drama—marginal, contingent, rather that the revolution many of us thought was coming.

But whether or not this is true, our conclusion is that each of us is still *en route* to a full understanding of the implications of electronic technologies for higher education. We would emphasize, however, that our different disciplines seem to require different choices, different ways of using those technologies or reasons for not using them. One size does not fit all!

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